FORM PTO-1449

SIXTH SUPPLEMENTAL INFORMATION DISCLOSURE STATEMENT

ATTY. DOCKET NO. 2005.0020003	APPLICATION NO. 09/604,097
APPLICANTS Yukio SHAKUDA	
FILING DATE June 27, 2000	GROUP 2828

FOREIGN PATENT DOCUMENTS

EXAMINER INITIAL		DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUB-CLASS	TRANSLATION
	AA						
	AB						
TN	AC40	2500319 B2	05/1996	JP			Abstract Enclosed
	AD40	2556211 B2	11/1996	JP			Abstract Enclosed

OTHER (Including Author, Title, Date, Pertinent Pages, etc.)

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EXAMINER	DATE CONSIDERED
Tuan Nguyen	8/27/04

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EXAMINER INITIAL		DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUB-CLASS	TRANSLATION
TN	AA41	2587825 B2	03/1997	JP			Abstract Enclosed
	AB41	2623463 B2	06/1997	JP			Abstract Enclosed
	AC41	2623466 B2	06/1997	JP			Abstract Enclosed
	AD41	2631285 B2	07/1997	JP			Abstract Enclosed

OTHER (Including Author, Title, Date, Pertinent Pages, etc.)

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EXAMINER Tuan Nguyen DATE CONSIDERED 8/27/04

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EXAMINER INITIAL		DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUB-CLASS	TRANSLATION
TN	AA42	2631286 B2	07/1997	JP			Abstract Enclosed
	AB42	2666228 B2	10/1997	JP			Abstract Enclosed
	AC42	2728190 B2	03/1998	JP			Abstract Enclosed
	AD42	2740818 B2	04/1998	JP			Abstract Enclosed

OTHER (Including Author, Title, Date, Pertinent Pages, etc.)

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TN	AA43	2748355 B2	05/1998	JP			Abstract Enclosed
	AB43	2751987 B2	05/1998	JP			Abstract Enclosed
	AC43	2790237 B2	08/1998	JP			Abstract Enclosed
	AD43	2812375 B2	10/1998	JP			Abstract Enclosed

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TN	AA44	2818776 B2	10/1998	JP			Abstract Enclosed
	AB44	2829311 B2	11/1998	JP			Abstract Enclosed
	AC44	2829319 B2	11/1998	JP			Abstract Enclosed
	AD44	2849642 B2	01/1999	JP			Abstract Enclosed

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EXAMINER INITIAL		DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUB-CLASS	TRANSLATION
TN	AA45	2895566 B2	05/1999	JP			Abstract Enclosed
	AB45	2914014 B2	06/1999	JP			Abstract Enclosed
	AC45	2914065 B2	06/1999	JP			Abstract Enclosed
	AD45	2917742 B2	07/1999	JP			Abstract Enclosed

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June 27, 2000	2828

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EXAMINER INITIAL		DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUB-CLASS	TRANSLATION
TN	AA46	2947047 B2	09/1999	JP			Abstract Enclosed
	AB46	2982553 B2	11/1999	JP			Abstract Enclosed
	AC						
	AD						

OTHER (Including Author, Title, Date, Pertinent Pages, etc.)

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ELECTRONIC INFORMATION DISCLOSURE STATEMENT

Electronic Version v18
Stylesheet Version v18.0

Title of Invention	Semiconductor Light Emitting Device and Manufacturing Method Therefor

Application Number: 09/604097
Confirmation Number: 6648
First Named Applicant: Yukio SHAKUDA
Attorney Docket Number: 2005.0020003
Art Unit: 2828
Examiner: Tuan N. Nguyen
Search string: (3226270 or 3364084 or 3433684 or 3604991 or 3733561 or 3758875 or 3819974 or 3983509 or 3984262 or 4063189 or 4249142 or 4328469 or 4335461 or 4371966 or 4675709 or 4839899 or 4984242 or 4999841 or 5008718 or 5023880 or 5048036 or 5060028 or 5138404 or 5153148 or 5164798 or 5212705 or 5233204 or 5235609 or 5252466 or 5301202 or 5359209 or 5369658 or 5395792 or 5483547 or 5555271 or 5583881 or 5689123 or 6009112).pn.

US Patent Documents

Note: Applicant is not required to submit a paper copy of cited US Patent Documents

init	Cite.No.	Patent No.	Date	Patentee	Kind	Class	Subclass
	1	3226270	1965-12-28	Miederer et al.			
	2	3364084	1968-01-16	Ruehrwein			
	3	3433684	1969-03-18	Zanowick et al.			
	4	3604991	1971-09-14	Yonezu et al.			
	5	3733561	1973-05-15	Hayashi			
	6	3758875	1973-09-11	Hayashi			
	7	3819974	1974-06-25	Stevenson et al.			
	8	3983509	1976-09-28	Scifres et al.			
	9	3984262	1976-10-05	Burnham et al.			
	10	4063189	1977-12-13	Scifres et al.			
	11	4249142	1981-02-03	Burnham et al.			

	12	4328469	1982-05-04	Scifres et al.
	13	4335461	1982-06-15	Streifer et al.
	14	4371966	1983-02-01	Scifres et al.
	15	4675709	1987-06-23	Scifres et al.
	16	4839899	1989-06-13	Burnham et al.
	17	4984242	1991-01-08	Scifres et al.
	18	4999841	1991-03-12	Sakiyama et al.
	19	5008718	1991-04-16	Fletcher et al.
	20	5023880	1991-06-11	Suzuki et al.
	21	5048036	1991-09-10	Scifres et al.
	22	5060028	1991-10-22	Kuo et al.
	23	5138404	1992-08-11	Ishikawa et al.
	24	5153148	1992-10-06	Sakiyama et al.
	25	5164798	1992-11-17	Huang
	26	5212705	1993-05-18	Kahen et al.
	27	5233204	1993-08-03	Fletcher et al.
	28	5235609	1993-08-10	Uchida et al.
	29	5252466	1993-10-12	Cronan, Jr.
	30	5301202	1994-04-05	Harder et al.
	31	5359209	1994-10-25	Huang
	32	5369658	1994-11-29	Ikawa et al.
	33	5395792	1995-03-07	Ikawa et al.
	34	5483547	1996-01-09	Adams et al.
	35	5555271	1996-09-10	Honda et al.
	36	5583881	1996-12-10	Uchida et al.
	37	5689123	1997-11-18	Major et al.
	38	6009112	1999-12-28	Uchida

Signature

Examiner Name	Date
Tuan Nguyen	8/21/04

FORM PTO-1449

SEVENTH SUPPLEMENTAL
INFORMATION DISCLOSURE STATEMENT

ATTY. DOCKET NO.	APPLICATION NO.
2005.0020003	09/604,097
INVENTOR	
Yukio SHAKUDA	
FILING DATE	ART UNIT
June 27, 2000	2828

FOREIGN PATENT DOCUMENTS

EXAMINER INITIAL	DOC. REF.	DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUB-CLASS	TRANSLATION
	AA						N/A
	AB						N/A
TN	AC46	1,325,582	12/1993	CA			N/A
	AD46	0 356 059 A2	02/1990	EP			N/A

OTHER (Including Author, Title, Date, Pertinent Pages, etc.)

	AE	
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TN	AK47	*Response of Nichia America Corporation To Amended Complaint of Rohm Co., Ltd. And Notice of Investigation*, with Exhibits D-H, 120 Pages, Dated February 13, 2001 In the Matter of Certain Semiconductor Light Emitting Devices, Components Thereof, and Products Containing Same, Investigation No. 337-TA-444 before the U.S. International Trade Commission.

EXAMINER	DATE CONSIDERED
Tuan Nguyen	8/27/04

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2005.0020003	09/604,097
INVENTOR	
Yukio SHAKUDA	
FILING DATE	ART UNIT
June 27, 2000	2828

FOREIGN PATENT DOCUMENTS

EXAMINER INITIAL	DOC. REF.	DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUB-CLASS	TRANSLATION
TN	AA47	778,383	07/1957	GB			N/A
	AB47	1,011,979	12/1965	GB			N/A
	AC47	2-74088 A	03/1990	JP			Abstract Enclosed
	AD47	2-111016 A	04/1990	JP			Abstract Enclosed

OTHER (Including Author, Title, Date, Pertinent Pages, etc.)

TN	AE48	*Respondent Nichia Corporation's Objections and Responses To Complainant Rohm Co., Ltd.'s Fourth Set of Interrogatories Nos. 110-120*, 20 Pages, Dated March 28, 2001 In the Matter of Certain Semiconductor Light Emitting Devices, Components Thereof, and Products Containing Same, Investigation No. 337-TA-444 before the U.S. International Trade Commission.
	AF48	*Order No. 6: Denying Motion of Respondents Nichia Corporation and Nichia America Corporation for Sanctions for Abuse of Commission Process, and to Show Cause Why Rohm Co. Ltd. Has Not Violated Commission Rule 210.4(c)*, 12 Pages, Dated June 27, 2001 In the Matter of Certain Semiconductor Light Emitting Devices, Components Thereof, and Products Containing Same, Investigation No. 337-TA-444 before the U.S. International Trade Commission.
	AG48	*Response and Counterclaim of Nichia Corporation and Nichia America Corporation*, 27 Pages, Dated November 9, 2001, in Rohm Co., Ltd. v. Nichia Corporation and Nichia America Corporation v. Rohm Co., Ltd., and Cree, Inc., Civil Action No. 00-CV-6379, U.S. District Court for the Eastern District of Pennsylvania.
	AH48	*Notice*, 4 Pages, Dated March 8, 2002 In the Matter of Certain Semiconductor Light Emitting Devices, Components Thereof, and Products Containing Same, Investigation No. 337-TA-444 before the U.S. International Trade Commission.
	AI48	*Nichia's Expedited Motion to Declare Rohm's Certificates of Correction Ineffective for this Action*, 3 Pages, Dated June 26, 2003, in Rohm Co., Ltd. v. Nichia Corporation and Nichia America Corporation v. Rohm Co., Ltd., Civil Action No. 00-CV-6379, U.S. District Court for the Eastern District of Pennsylvania.
	AJ48	*Memorandum in Support of Nichia's Expedited Motion to Declare Rohm's Certificates of Correction Ineffective for this Action*, with Exhibits A-H, 61 Pages, Dated June 26, 2003, in Rohm Co., Ltd. v. Nichia Corporation and Nichia America Corporation v. Rohm Co., Ltd., Civil Action No. 00-CV-6379, U.S. District Court for the Eastern District of Pennsylvania.
	AK48	*Nichia Corporation's Objections and Responses to Rohm's Second Set of Interrogatories (Nos. 9-15)*, 16 Pages, Dated July 10, 2003, in Rohm Co., Ltd. v. Nichia Corporation and Nichia America Corporation v. Rohm Co., Ltd., Civil Action No. 00-CV-6379, U.S. District Court for the Eastern District of Pennsylvania.

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Tuan Nguyen	8/27/04

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FORM PTO-1449 SEVENTH SUPPLEMENTAL INFORMATION DISCLOSURE STATEMENT	ATTY. DOCKET NO. 2005.0020003	APPLICATION NO. 09/604,097
	INVENTOR Yukio SHAKUDA	
	FILING DATE June 27, 2000	ART UNIT 2828

FOREIGN PATENT DOCUMENTS

EXAMINER INITIAL	DOC. REF.	DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUB-CLASS	TRANSLATION
TN	AA48	3-85785 A	04/1991	JP			Abstract Enclosed
	AB48	3-289187 A	12/1991	JP			Abstract Enclosed
	AC48	4-111375 A	04/1992	JP			Abstract Enclosed
	AD48	4-130692 A	05/1992	JP			Abstract Enclosed

OTHER (Including Author, Title, Date, Pertinent Pages, etc.)

TN	AE49	*Nichia's Brief in Opposition to Rohm's Motion for Leave to File a Supplemental Pleading and in Support of Nichia's Expedited Motion to Declare Rohm's Certificates of Correction Ineffective for this Action*, 7 Pages, Dated July 22, 2003, in Rohm Co., Ltd. v. Nichia Corporation and Nichia America Corporation v. Rohm Co., Ltd., Civil Action No. 00-CV-6379, U.S. District Court for the Eastern District of Pennsylvania.
	AF49	*Nichia's Motion to Strike the '899 Patent from the Case*, 3 Pages, Dated September 11, 2003, in Rohm Co., Ltd. v. Nichia Corporation and Nichia America Corporation v. Rohm Co., Ltd., Civil Action No. 00-CV-6379, U.S. District Court for the Eastern District of Pennsylvania.
	AG49	*Memorandum in Support of Nichia's Motion to Strike the '899 Patent from the Case*, with Exhibits 1-2, 63 Pages, Dated September 11, 2003, in Rohm Co., Ltd. v. Nichia Corporation and Nichia America Corporation v. Rohm Co., Ltd., Civil Action No. 00-CV-6379, U.S. District Court for the Eastern District of Pennsylvania.
	AH49	*Brief of Rohm Co., Ltd. in Opposition to Nichia's Motion to Strike the '899 Patent from the Case*, with Exhibits 1-4, 29 Pages, Dated September 25, 2003, in Rohm Co., Ltd. v. Nichia Corporation and Nichia America Corporation v. Rohm Co., Ltd., Civil Action No. 00-CV-6379, U.S. District Court for the Eastern District of Pennsylvania.
	AI49	*Nichia's Opposition to Rohm's Motion to Compel*, with Exhibit 1, 48 Pages, Dated September 26, 2003, in Rohm Co., Ltd. v. Nichia Corporation and Nichia America Corporation v. Rohm Co., Ltd., Civil Action No. 00-CV-6379, U.S. District Court for the Eastern District of Pennsylvania.
	AJ49	*Reply Memorandum in Support of Nichia's Motion to Strike the '899 Patent from the Case*, 10 Pages, Dated October 2, 2003, in Rohm Co., Ltd. v. Nichia Corporation and Nichia America Corporation v. Rohm Co., Ltd., Civil Action No. 00-CV-6379, U.S. District Court for the Eastern District of Pennsylvania.
	AK49	*Nichia's Emergency Motion to Compel the Deposition of Alleged Sole Inventor Yukio Shakuda to Proceed on January 30, 2004 and to Compel Shakuda to Review and Bring Documents Supporting His Alleged Inventorship*, with Proposed Order, 7 Pages, Dated October 8, 2003, in Rohm Co., Ltd. v. Nichia Corporation and Nichia America Corporation v. Rohm Co., Ltd., Civil Action No. 00-CV-6379, U.S. District Court for the Eastern District of Pennsylvania.

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INVENTOR	
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FILING DATE	ART UNIT
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EXAMINER INITIAL	DOC. REF.	DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUB-CLASS	TRANSLATION
TN	AA49	4-144296 A	05/1992	JP			Abstract Enclosed
	AB49	4-309281 A	10/1992	JP			Abstract Enclosed
	AC49	5-160504 A	06/1993	JP			Abstract Enclosed
	AD49	2908815 B2	04/1999	JP			Abstract Enclosed

OTHER (Including Author, Title, Date, Pertinent Pages, etc.)

TN	AE50	*Brief in Support of Nichia's Emergency Motion to Compel the Deposition of Alleged Sole Inventor Yukio Shakuda to Proceed on January 30, 2004 and to Compel Shakuda to Review and Bring Documents Supporting His Alleged Inventorship*, with Exhibits A-D, 33 Pages, Dated October 8, 2003, in Rohm Co., Ltd. v. Nichia Corporation and Nichia America Corporation v. Rohm Co., Ltd., Civil Action No. 00-CV-6379, U.S. District Court for the Eastern District of Pennsylvania.
	AF50	*Clarification to Nichia's Motion to Strike the '899 Patent from the Case and Nichia's Response to Rohm's Motion to Compel*, with Exhibits A-C, 16 Pages, Dated October 14, 2003, in Rohm Co., Ltd. v. Nichia Corporation and Nichia America Corporation v. Rohm Co., Ltd., Civil Action No. 00-CV-6379, U.S. District Court for the Eastern District of Pennsylvania.
	AG50	*Reply Memorandum in Support of Nichia's Motion Compel*, with Exhibit 1, 24 Pages, Dated November 3, 2003, in Rohm Co., Ltd. v. Nichia Corporation and Nichia America Corporation v. Rohm Co., Ltd., Civil Action No. 00-CV-6379, U.S. District Court for the Eastern District of Pennsylvania.
	AH50	*Reply Brief in Support of Nichia's Emergency Motion to Compel the Deposition of Alleged Sole Inventor Yukio Shakuda to Proceed on January 30, 2004 and to Compel Shakuda to Review and Bring Documents Supporting His Alleged Inventorship*, with Exhibits A-D, 29 Pages, Dated December 4, 2003, in Rohm Co., Ltd. v. Nichia Corporation and Nichia America Corporation v. Rohm Co., Ltd., Civil Action No. 00-CV-6379, U.S. District Court for the Eastern District of Pennsylvania.
	AI50	*Motion and Stipulation of Voluntary Dismissal with Prejudice Pursuant to Federal Rule of Civil Procedure 41(a)(2)*, 2 Pages, Dated February 12, 2004, in Rohm Co., Ltd. v. Nichia Corporation and Nichia America Corporation, Civil Action No. 00-CV-6379, U.S. District Court for the Eastern District of Pennsylvania.
	AJ50	"Hole Compensation Mechanism of p-Type GaN Films," 9 pages.
	AK50	"Shallow Impurity Passivation by Atomic Hydrogen," 14 pages.

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TN	AA50	6-219892 A	08/1994	JP			Abstract Enclosed
	AB50						N/A
	AC50						N/A
	AD50						N/A

OTHER (Including Author, Title, Date, Pertinent Pages, etc.)

TN	AE51	Lockwood, H.F. *et al.*, "An Efficient Large Optical Cavity Injection Laser," *Applied Physics Letters*, Vol. 17, No. 11, pp. 499-502 (December 1, 1970).
	AF51	Thompson, G.H.B. and Kirkby, P.A., "(GaAl)As Lasers With a Heterostructure for Optical Confinement and Additional Heterojunctions for Extreme Carrier Confinement," *IEEE Journal of Quantum Electronics*, Vol. QE-9, No. 2, pp. 311-318 (February 1973).
	AG51	Maruska, H.P. *et al.*, "Microstructural Observations on Gallium Nitride Light-Emitting Diodes," *J. Electrochem. Soc.: Solid-State Science and Technology*, pp. 1202-1207 (September 1974).
	AH51	Robinson, R.J. and Kun, Z.K., "*p-n* junction zinc sulfo-selenide and zinc selenide light-emitting diodes," *Applied Physics Letters*, Vol. 27, No. 2, American Institute of Physics, pp. 74-76 (July 15, 1975).
	AI51	Pearton, S.J. *et al.*, "Hydrogen passivation of shallow level impurities and deep level defects in GaAs," *Inst. Phys. Conf. Ser. No. 83: Chapter 5*, (Paper presented at Int. Symp. GaAs and Related Compounds, Las Vegas, Nevada), pp. 289-294, IOP Publishing Ltd. (1986).
	AJ51	Thompson, G.H.B. *et al.*, "Narrow-beam five-layer (GaAl)As/GaAs heterostructure lasers with low threshold and high peak power," *Journal of Applied Physics*, Vol. 47, No. 4, American Institute of Physics, pp. 1501-1505 (April 1976).
	AK51	Chinone, N. *et al.*, "Highly efficient (GaAl)As buried-heterostructure lasers with buried optical guide," *Applied Physics Letters*, Vol. 35, No. 7, pp. 513-516 (October 1, 1979).

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	AA51						N/A
	AB51						N/A
	AC51						N/A
	AD51						N/A

OTHER (Including Author, Title, Date, Pertinent Pages, etc.)

TN	AE52	Thompson, G.H.B., *Physics of Semiconductor Laser Devices*, John Wiley & Sons, pp. 262-268 (1980).
	AF52	Botez, D., "cw high-power single-mode operation of constricted double-heterojunction AlGaAs lasers with a large optical cavity," *Applied Physics Letters*, Vol. 36, No. 3, American Institute of Physics, pp. 190-192 (February 1, 1980).
	AG52	Mito, I. *et al.*, "InGaAsP Planar Buried Heterostructure Laser Diode (PBH-LD) with Very Low Threshold Current," *Electronics Letters*, Vol. 18, No. 1, pp. 2-3 (January 7, 1982).
	AH52	Kun, Z.K., "The variation of residual impurities in ZnSe crystals used in light-emitting diode fabrications," *Journal of Applied Physics*, Vol. 53, No. 2, American Institute of Physics, pp. 1248-1250 (February 1982).
	AI52	Magnea, N. *et al.*, "SEM and Photoluminescence Study of Li Segregation in Annealed Zinc Telluride," *Solid State Communications*, Vol. 29, No. 1, Pergamon Press Ltd., pp. 35-38 (1979).
	AJ52	Dean, P.J. *et al.*, "Ionization energy of the shallow nitrogen acceptor in zinc selenide," *Physical Review B*, Vol. 27, No. 4, The American Physical Society, pp. 2419-2428 (February 15, 1983).
	AK52	Khan, M.A. *et al.*, "Properties and ion implantation of $Al_xGa_{1-x}N$ epitaxial single crystal films prepared by low pressure metalorganic chemical vapor deposition," *Applied Physics Letters*, Vol. 43, No. 5, American Institute of Physics, pp. 492-494 (September 1, 1983).

EXAMINER	DATE CONSIDERED
Tuan Nguyen	8/17/04

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ATTY. DOCKET NO.	APPLICATION NO.
2005.0020003	09/604,097
INVENTOR	
Yukio SHAKUDA	
FILING DATE	ART UNIT
June 27, 2000	2828

FOREIGN PATENT DOCUMENTS

EXAMINER INITIAL	DOC. REF.	DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUB-CLASS	TRANSLATION
	AA52						N/A
	AB52						N/A
	AC52						N/A
	AD52						N/A

OTHER (Including Author, Title, Date, Pertinent Pages, etc.)

TN	AE53	Sah, C.-T. *et al.*, "Study of the atomic models of three donor-like traps on oxidized silicon with aluminum gate from their processing dependencies," *Journal of Applied Physics*, Vol. 54, No. 10, American Institute of Physics, pp. 5864-5879 (October 1983).
	AF53	Pankove, J.I. *et al.*, "Neutralization of Shallow Acceptor Levels in Silicon by Atomic Hydrogen," *Physical Review Letters*, Vol. 51, No. 24, The American Physical Society, pp. 2224-2225 (December 12, 1983).
	AG53	Hashimoto, M., "Effects of Hydrogen in an Ambient on the Crystal Growth of GaN Using $Ga(CH_3)_3$ and NH_3," *Journal of Crystal Growth*, Vol. 68, Elsevier, Science Publishers B.V., pp. 163-168 (1984).
	AH53	Stringfellow, G.B., "A Critical Appraisal of Growth Mechanisms in MOVPE," *Journal of Crystal Growth*, Vol. 68, Science Publishers B.V., pp. 111-122 (1984).
	AI53	Gowar, J., *Optical Communication Systems*, Second Edition, Prentice Hall, p. 414 (1984).
	AJ53	Pankove, J.I. *et al.*, "Hole-mediated chemisorption of atomic hydrogen in silicon," *Applied Physics Letters*, Vol. 47, No. 7, American Institute of Physics, pp. 748-750 (October 1, 1985).
	AK53	Hartmann, H. *et al.*, *Wide gap II-VI compounds as electronic materials*, pp. 352, 353, 368, 369, 646, 647, 650 and 651.

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Tuan Nguyen	8/27/04

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TN	AE54	Agrawal, G.P. and Dutta, N.K., *Long-Wavelength Semiconductor Lasers*, Van Nostrand Reinhold Company, p. 194 (1986).
	AF54	Mawst, L.J. *et al.*, "MOCVD of III-V Compound Epitaxial Layers," *Semiconductor International*, pp. 61-63 (November 1986).
	AG54	Pajot, B. *et al.*, "Spectroscopic evidence for the hydrogen passivation of zinc acceptors in gallium arsenide," *Semiconductor Science Technology 2*, IOP Publishing Ltd., pp. 305-307 (1987).
	AH54	Koide, Y. *et al.*, "Energy band-gap bowing parameter in an $AL_xGA_{1-x}N$ alloy," *Journal of Applied Physics*, Vol. 61, No. 9, American Institute of Physics, pp. 4540-4543 (May 1, 1987).
	AI54	Yoo, T.-K. *et al.*, "Surface-Emitting AlGaAs/GaAs DH LED with Buried-Window Cylindrical Lens," pp. L2357-L2360 (December 1988).
	AJ54	Linden, K.J., "MOCVD: Expanding The Range of Photonic Materials," *Photonics Spectra*, pp. 91, 92, 94-98 and 100 (February 1991).
	AK54	Chevallier, J. *et al.*, "Donor neutralization in GaAs(Si) by atomic hydrogen," *Applied Physics Letters*, Vol. 47, No. 2, American Institute of Physics, pp. 108-110 (1985).

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TN	AE55	Moustakas, T.D. and Molnar, R.J., "Growth and Doping of GaN Films by ECR-Assisted MBE," *Mat. Res. Soc. Symp. Proc.*, Vol. 281, Materials Research Society, pp. 753, 755, 757, 759, 761 and 763 (1993).
	AF55	*Transmission Mode 3rd Gen. Photocathode Configuration*, 1 page.
	AG55	Van Vechten, J.A. *et al.*, "Defeating Compensation in Wide Gap Semiconductors by Growing in H that is Removed by Low Temperature De-Ionizing Radiation," *Japanese Journal of Applied Physics*, Vol. 31, Part 1, No. 11, pp. 3662-3663 (November 1992).
	AH55	Andrews, J.E., "MO-CVD promises to be a cost-effective epitaxial technique," *Vacuum Technology*, 3 pages (January 1983).
	AI55	Hartmann, H. *et al.*, "Wide Gap II-VI Compounds as Electronic Materials," *Current Topics in Materials Science*, Vol. 9, North-Holland Publishing Company, pp. 1, 352, 353, 360, 361, 368 and 369 (1982).
	AJ55	Gossmann, H.-J. *et al.*, "Doping of Si thin films by low-temperature molecular beam epitaxy," *Journal of Applied Physics*, Vol. 73, No. 12, American Institute of Physics, pp. 8237-8241 (June 15, 1993).
	AK55	Neugebauer, J. and Van de Walle, C.G., "Theory of Point Defects and Complexes in GaN, pp. 645-656.

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TN	AE56	"APA, AT&T In Laser Technology Pact," *Electronic News*, p. 50, February 7, 1994).
	AF56	"Blue-Green-Laser Pact Signed by APA Optics and AT&T," *BusinessWorld Briefs*, 1 page (March 1994).
	AG56	Wang, C. and Davis, R.F., "Deposition of highly resistive, undoped, and *p*-type, magnesium-doped gallium nitride films by modified gas source molecular beam epitaxy," *Applied Physics Letters*, Vol. 63, No. 7, American Institute of Physics, pp. 990-992 (August 16, 1993).
	AH56	Sze, S.M., *Physics of Semiconductor Devices*, Second Edition, John-Wiley & Sons, pp. 724-730 (1981).
	AI56	Fukuda, M., *Reliability and Degradation of - Semiconductor Lasers and LEDs*, Artech House, pp. 43-45 and 73-79 (1991).
	AJ56	Thompson, G.H.B., *Physics of Semiconductor Laser Devices*, John Wiley & Sons, pp. 156, 157, 262, 262-265 (1980).
	AK56	Wood, D. *Optoelectric Semiconductor Devices*, Prentice Hall, pp. 111, 149-154, 157-159, 185 and 203 (1994).

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TN	AE57	Einspruch, N.G. and Frensley, W.R. (eds)., *Heterostructures and Quantum Devices*, Academic Press, pp. 220-222 (1994).
	AF57	Verdeyen, J. T., *Laser Electronics*, Second Edition, Prentice Hall, pp. 389-392 (1989).
	AG57	Osamura, K. *et al.*, "Fundamental Absorption Edge In GaN, InN and Their Alloys," *Solid State Communications*, Vol. 11, No. 5, Pergamon Press, pp. 617-621 (1972).
	AH57	Akasaki, I. and Amano, H., "MOVPE Growth of High Quality $Al_xGa_{1-x}N/Ga_yIN_{1-y}N$ ($x \geq 0$, $y \leq 1$) Heterostructures for Short Wavelength Light Emitter," *Materials Research Society Symposium Proceedings*, Vol. 339, pp. 443-452 (1994).
	AI57	Amano, H. *et al.*, "Room-temperature violet stimulated emission from optically pumped AlGaN/GaInN double heterostructure," *Applied Physics Letters*, Vol. 64, No. 11, American Institute of Physics, pp. 1377-1379 (March 14, 1994).
	AJ57	Samid, I. *et al.*, "High-Peak-Power Asymmetric Double-Heterostructure (GaAl)As-GaAs Injection Laser," *Electronics Letters*, Vol. 19, No. 19, The Institute of Electrical Engineers, pp. 754-755 (September 15, 1983).
	AK57	Sun, H. C. *et al.*, "Properties of a Tunneling Injection Quantum-Well Laser: Recipe for a "Cold" Device with a Large Modulation Bandwidth," *IEEE Photonics Technology Letters*, Vol. 5, No. 8, IEEE, pp. 870-872 (August 1993).

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TN	AE58	Kamata, N. *et al.*, "Separation of non-radiative and below-gap emission lifetimes in a heavily Si-doped GaAs/AlGaAs quantum well," *Journal of Luminescence 48 & 49*, Elsevier Science Publishers B.V., pp. 763-767 (1991).
	AF58	Tsuchiya, H. *et al.*, "Intersubband Absorption Changes In GaAs/AlGaAs MQW Induced by External Light," *Surface Science*, Vol. 238, Nos. 1-3, North-Holland, pp. 172-175 (1990).
	AG58	Katahama, H. *et al.*, "Band and Deep Emission and Their Recombination Processes in a Heavily Si Doped GaAs/AlGaAs Quantum Well," *Superlattices and Microstructures*, Vol. 5, No. 4, Academic Press Limited, pp. 523-526 (1989).
	AH58	Fujimoto, I. *et al.*, "Behaviour of heavily doped Si atoms in MBE grown GaAs revealed by X-ray quasi-forbidden reflection (XFR) method and photoluminescence measurement," *Inst. Phys. Conf. Ser. No. 91: Chapter 3, Paper presented at Int. Symp. GaAs and Related Compounds, Heraklion, Greece*, IOP Publishing Ltd., pp. 247-250 (1988).
	AI58	Streifer, W. *et al.*, "An Analytic Study of (GaAl)As Gain Guided Lasers at Threshold," *IEEE Journal of Quantum Electronics*, Vol. QE-18, No. 5, IEEE, pp. 856-864 (May 1982).
	AJ58	Scifres, D.R. *et al.*, "Leaky wave room-temperature double heterostructure HaAs:GaAlAs diode laser," *Applied Physics Letters*, Vol. 29, No. 1, American Institute of Physics, pp. 23-25 (July 1, 1976).
	AK58	Mataki, H. and Tanaka, H., "Mass production of laser diodes by MBE," *Microelectronics Journal*, Vol. 25, No. 8, Elsevier Science Lid., pp. 619-630 (1994).

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TN	AE59	Mataki, H. *et al.*, "Mass production of AlGaAs laser diodes using MBE," *SPIE Proceedings: Fiber Optic Materials and Components*, The International Society for Optical Engineering, Vol. 2290, pp. 321-330 (July 28-29, 1984).
	AF59	Sakiyama, H. and Takuma, H., "AlGaAs Laser Diodes by the Molecular Beam Epitaxy Method," *Journal of Electronic Engineering*, Vol. 26, No. 270, Dempa Publications, Inc., pp. 40-42 (May 1989).
	AG59	Smith, F.W. *et al.*, "New MBE Buffer Used to Eliminate Backgating in GAAs MESFET's," *IEEE Electron Device Letters*, Vol. 9, No. 2, IEEE, pp. 77-80 (February 1988).
	AH59	Tsou, Y. and Garmire, E.M., "Improving InAs Double Heterostructure Lasers with Better Confinement," *IEEE Journal of Quantum Electronics*, Vol. 28, No. 5, pp. 1261-1268 (May 1992).
	AI59	Kawanaka, S. *et al.*, "Strained Single Quantum Well AlGaInP Laser Diodes with an Asymmetric Waveguiding Layer," *Extended Abstracts of the 1992 International Conference on Solid State Devices and Materials, Tsukuba*, pp. 240-242 (August 26-28, 1992).
	AJ59	Itaya, K. *et al.*, "Highly Reliable 100mW Operation of Broad Area InGaAlP Visible Light Laser Diodes," *Electronics Letters*, Vol. 27, No. 24, pp. 2257-2259 (November 21, 1991).
	AK59	Botez, D., "The Effect of Carried-Induced Index Depressions on Fundamental-Transverse-Mode Characteristics in DH Laser Structures," *RCA Review*, Vol. 45, No. 1, RCA Laboratories, pp. 23-32 (March 1984).

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TN	AE60	Kazi, K. and Jain, F.C., "Modal Analysis of IncGaAsP-InP, GaAs/AlGaAs-GaAs, and InGaAsP/AlGaAs-GaAs MIS Heterostructure Lasers," *International Journal of Infrared and Millimeter Waves*, Vol. 7, No. 6, Plenum Publishing Corporation, pp. 891-907 (June 1986).
	AF60	Murata, H. *et al.*, "Low Threshold Current Density of 620 nm Band MQW-SCH AlGaInP Semiconductor Lasers With Mg Doped AlInP Cladding Layer," *Electronics Letters*, Vol. 27, No. 17, IEE, pp. 1569-1571 (August 15, 1991).
	AG60	Shah, P. and Mitin, V., "Threshold Characteristics of Blue to Ultraviolet Light Emitting Semiconductor Lasers Based on the AlGaN Material System," IEEE, pp. 160-169 (1995).
	AH60	Kolbas, R.M. and Krishnankutty, S., "Optoelectronic Properties of GaN, AlGaN and AlGaN-GaN Quantum Well Heterostructures," pp. 19-20.
	AI60	Akasaki, I. and Amano, H., "UV/Blue Light Emitting AlGaN/GaN Heterostructures," pp. 14-15.
	AJ60	Benchimol, J.L. *et al.*, "Growth and modelling of InAsPSb. InAs double heterostructures," *Inst. Phys. Conf. Ser. No. 83: Chapter 7 - Paper presented at Int. Symp. GaAs and Related Compounds, Las Vegas, Nevada*, IOP Publishing Ltd., pp. 385-390 (September 28 - October 1, 1986).
	AK60	Suemune, I., "Theoretical Estimation of Leakage Current in II-VI Heterostructure Lasers," *Japanese Jounral of Applied Physics*, Vol. 31, Part 2, No. 2A, pp. L95-L98 (February 1, 1992).

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TN	AE61	Watanabe, M.O. and Ohba, Y., "Interface properties for GaAs/InGaAlP heterojunctions by the capacitance-voltage profiling technique," *Applied Physics Letters*, Vol. 50, No. 14, American Institute of Physics, pp. 906-908 (April 6, 1987).
	AF61	Yablonovitch, E. and Kane, E.O., "Reduction of Lasing Threshold Current Density by the Lowering of Valence Band Effective Mass," *Journal of Lightwave Technology*, Vol. LT-4, No. 5, IEEE, pp. 504-506 (May 1986).
	AG61	Mori, K. *et al.*, "Band Discontinuity Reduction of i-GaInAsP/p-InP for Improving 1.55μm GaInAsP/InP Surface Emitting Laser Performances," *Conference Proceedings - Sixth International Conference on Indium Phosphide and Related* Materials, IEEE, pp. 311-314 (March 27-31, 1994).
	AH61	Ohki, Y. *et al.*, "Fabrication and properties of a practical blue-emitting GaN m-i-s diode," *Inst. Phys. Conf. Ser. No. 63: Chapter 10 - Paper presented at Int. Symp. GaAs and Related Compounds, Japan*, The Institute of Physics, pp. 479-484 (1981).
	AI61	Amano, H. *et al.*, "Metalorganic vapor phase epitaxial growth of a high quality GaN film using an AlN buffer layer," *Applied Physics Letters*, Vol. 48, No. 5, American Institute of Physics, pp. 353-355 (February 3, 1986).
	AJ61	Haase, M.A. *et al.*, "Blue-green laser diodes," *Applied Physics Letters*, Vol. 59, No. 11, American Institute of Physics, pp. 1272-1274 (September 9, 1991).
	AK61	Amano, H. *et al.*, "Stimulated Emission Near Ultraviolet at Room Temperature from a GaN Film Grown on Sapphire by MOVPE Using an AlN Buffer Layer," *Japanese Journal of Applied Physics*, Vol. 29, No. 2, pp. L205-L206 (February 1990).

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TN	AE62	Khan, M.A. *et al.*, "Vertical-cavity, room-temperature stimulated emission from photopumped GaN films deposited over sapphire substrates using low-pressure metalorganic chemical vapor deposition," *Applied Physics Letters*, Vol. 58, No. 14, American Institute of Physics, pp. 1515-1517 (April 8, 1991).
	AF62	Kressel, H. and Butler, J.K. (eds.), *Semiconductor Lasers and Heterojunction LEDs*, Academic Press, pp. 137-141, 205-207, 222-235, 264-271, 280-287 and 456-461 (1977).
	AG62	Ohtsu, M., *Highly Coherent Semiconductor Lasers*, Artech House, Inc., pp. 15-21 (1992).
	AH62	Botez, D. and Connolly, J.C., "Terraced-heterostructure large-optical-cavity AlGaAs diode laser: A new type of high-power cw single-mode device," *Applied Physics Letters*, Vol. 41, No. 4, American Institute of Physics, pp. 310-312 (August 15, 1982).
	AI62	Henderson, G.N. *et al.*, "Optical transitions to above-barrier quasibound states in asymmetric semiconductor heterostructures," *Applied Physics Letters*, Vol. 62, No. 12, American Institute of Physics, pp. 1432-1434 (March 22, 1993).
	AJ62	Akasaki, I. and Amano, H., "Room Temperature Ultraviolet/Blue Light Emitting Devices Based on AlGaN/GaN Multi-Layered Structure," *Extended Abstracts of the 1992 International Conference on Solid State Devices and Materials, Tsukuba*, pp. 327-329 (1992).
	AK62	Akasaki, I. and Amano, H., "Widegap Column-III Nitride Semiconductors for UV/Blue Light Emitting Devices," *Journal of the Electrochemical Society*, Vol. 141, No. 8, The Electrochemical Society, Inc., pp. 2266-2271 (August 1994).

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TN	AE63	Amano, H. *et al.*, "Room-Temperature Low-Threshold Surface-Stimulated Emission by Optical Pumping from $AL_{0.1}Ga_{0.9}N$/GaN Double Heterostructure," *Japanese Journal of Applied Physics*, Vol. 32, Part 2, No. 7B, pp. L1000-L1002 (July 15, 1993).
	AF63	Ohtoshi, T. *et al.*, "High-power visible GaAlAs lasers with self-aligned strip buried heterostructure," *Journal of Applied Physics*, Vol. 56, No. 9, American Institute of Physics, pp. 2491-2496 (November 1, 1984).
	AG63	Evans, G.A. *et al.*, "Observations and Consequences of Nonuniform Aluminum Concentration in the Channel Regions of AlGaAs Channeled-Substrate-Planer Lasers," *IEEE Journal of Quantum Electronics*, Vol. QE-23, No. 11, IEEE, pp. 1900-1908 (November 11, 1987).
	AH63	Iyer, S.V. *et al.*, "Modeling of distortions in optical characteristics of semiconductor lasers due to noise in MBE growth temperature measurement," *SPIE Proceedings - Physics and Simulation of Optoelectronic Devices II*, Vol. 2146, The International Society for Optical Engineering, pp. 148-159 (January 24-26, 1994).
	AI63	Jennings, A. *et al.*, "Asymmetric Fabry-Perot Device Arrays with Low Insertion Loss and High Uniformity," *IEEE Photonics Technology Letters*, Vol. 4, No. 8, IEEE, pp. 858-860 (August 1992).
	AJ63	Koike, M. *et al.*, "Light-Emitting Devices Based on Gallium Nitride and Related Compound Semiconductors," *Materials Research Society Symposium Proceedings*, Vol. 395, Materials Research Society, pp. 889-895 (November 27 - December 1, 1995).
	AK63	Steigerwald, D. *et al.*, "III-V Nitride Semiconductors for High-Performance Blue and Green Light-Emitting Devices," *JOM*, pp. 18-23 (September 1997).

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TN	AE64	Figueroa, L. *et al.*, "High Power Semiconductor Lasers," *SPIE Proceedings - Progress in Laser Diodes*, Vol. 723, The International Society for Optical Engineering, pp. 2-24 (September 25-26, 1986).
	AF64	Garmire, E. *et al.*, "Longitudinal mode control in GaAs lasers using a three-mirror active-passive cavity," pp. 106-108, Reprinted from *Applied Physics Letters*, Vol. 39, No. 10, American Institute of Physics, pp. 789-791 (November 15, 1981).
	AG64	Reinhart, F.K. *et al.*, "GaAs-$Al_xGa_{1-x}As$ injection lasers with distributed Bragg reflectors," pp. 173-175, Reprinted from *Applied Physics Letters*, Vol. 27, No. 1, American Institute of Physics, pp. 45-48 (July 1, 1975).
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	AK64	Khan, M.A. *et al.*, "Growth of high optical and electrical quality GaN layers using low-pressure metalorganic vapor deposition," *Applied Physics Letters*, Vol. 58, No. 5, American Institute of Physics, pp. 526-527 (February 4, 1991).

EXAMINER Tuan Nguyen

DATE CONSIDERED 8/27/04

EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to Applicant.

FORM PTO-1449

SEVENTH SUPPLEMENTAL INFORMATION DISCLOSURE STATEMENT

ATTY. DOCKET NO.	APPLICATION NO.
2005.0020003	09/604,097
INVENTOR: Yukio SHAKUDA	
FILING DATE: June 27, 2000	ART UNIT: 2828

FOREIGN PATENT DOCUMENTS

EXAMINER INITIAL	DOC. REF.	DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUB-CLASS	TRANSLATION
	AA						N/A
	AB						N/A
	AC						N/A
	AD						N/A

OTHER (Including Author, Title, Date, Pertinent Pages, etc.)

TN	AE65	Akasaki, I. and Amano, H., "Conductivity Control of AlGaN, Fabrication of AlGaN/GaN Multi-Heterostructure and Their Application to UV/Blue Light Emitting Devices," *Materials Research Society Symposium Proceedings*, Vol. 242, Materials Research Society, pp. 383-394 (1992).
	AF65	Sturge, M.D. (ed.), *Journal of Luminescence: An Interdisciplinary Journal of Research on Excited State Processes in Condensed Matter*, Vols. 48 and 49, Part II, North-Holland, Cover page (1991).
	AG65	*Japanese Journal of Applied Physics*, Vol. 29, No. 4, Part 2 Letters, Table of Contents (April 1990).
	AH65	Christou, A. and Rupprecht, H.S. (eds.), *Proceedings of the Fourteenth International Symposium on Gallium Arsenide and Related Compounds held in Heraklion, Crete*, IOP Publishing Ltd., Cover page (September 28 - October 1, 1987).
	AI65	*Journal of Electronic Materials*, Vol. 19, No. 7, IEEE, pp. 17-18 (July 1990).
	AJ65	*CLEO®'94 Summaries of papers presented at the Conference on Lasers and Electro-Optics*, Vol. 8, pp. 202, 203 and 205 (May 8-13, 1994).
	AK65	Akasaki, I. and Amano, H., "Prospects of GaN-Based Laser Diode," *Japanese Journal of Optics*, Vol. 22, No. 11, pp. 670-675 (November 1993).

EXAMINER: Tuan Nguyen — DATE CONSIDERED: 8/27/04

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FORM PTO-1449

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2005.0020003	09/604,097
INVENTOR	
Yukio SHAKUDA	
FILING DATE	ART UNIT
June 27, 2000	2828

FOREIGN PATENT DOCUMENTS

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	AA						N/A
	AB						N/A
	AC						N/A
	AD						N/A

OTHER (Including Author, Title, Date, Pertinent Pages, etc.)

TN	AE66	Amano, H. and Akasaki, I., "Present and future prospects of GaN-based short-wavelength, light emitting devices," *Oyo Buturi*, Vol. 63, No. 12, pp. 1243-1247 (December 12, 1994).
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EXAMINER	DATE CONSIDERED
Tuan Nguyen	8/27/04

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INVENTOR: Yukio SHAKUDA	
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OTHER (Including Author, Title, Date, Pertinent Pages, etc.)

TN	AE67	Covington, B.C. *et al.*, "Infrared intersubband absorption in GaAs/AlAs multiple quantum wells," *Applied Physics Letters*, Vol. 54, No. 21, American Institute of Physics, pp. 2145 and 2147 (May 22, 1989).
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	AI67	Page showing graph of BGE v. mole fraction x of InGaAs for light hole, heavy hole, and unstrained structure, 1 page.
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SEVENTH SUPPLEMENTAL INFORMATION DISCLOSURE STATEMENT

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INVENTOR Yukio SHAKUDA	
FILING DATE June 27, 2000	ART UNIT 2828

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	AB						N/A
	AC						N/A
	AD						N/A

OTHER (Including Author, Title, Date, Pertinent Pages, etc.)

TN	AE68	Ekenberg, U., "Enhancement of nonparabolicity efffects in a quantum well," *Physical Review B*, Vol. 36, No. 11, The American Physical Society, pp. 6152 and 6154 (October 15, 1987).
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EXAMINER	DATE CONSIDERED
Tuan Nguyen	8/27/04

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FORM PTO-1449

SEVENTH SUPPLEMENTAL INFORMATION DISCLOSURE STATEMENT

ATTY. DOCKET NO.	APPLICATION NO.
2005.0020003	09/604,097
INVENTOR: Yukio SHAKUDA	
FILING DATE: June 27, 2000	ART UNIT: 2828

FOREIGN PATENT DOCUMENTS

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	AA						N/A
	AB						N/A
	AC						N/A
	AD						N/A

OTHER (Including Author, Title, Date, Pertinent Pages, etc.)

TN	AE69	Xu, Y.-N. and Ching, W.Y., "Electronic, optical, and structural properties of some wurtzite crystals," *Physical Review B*, Vol. 48, No. 7, The American Physical Society, pp. 4335-4348 (August 15, 1993).
	AF69	Mohammad, S.N. *et al.*, "Emerging Gallium Nitride Based Devices," *Proceedings of the IEEE*, Vol. 83, No. 10, pp. 1320-1355 (October 1995).
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	AK69	Pearton, S.J., "Hydrogenation of III-V Semiconductors During Processing," *Materials Science Forum*, Vols. 148-149, Trans Tech Publications, Switzerland, pp. 113-134, 138 and 139 (1994).

EXAMINER: Tuan Nguyen — DATE CONSIDERED: 8/27/04

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FORM PTO-1449

SEVENTH SUPPLEMENTAL INFORMATION DISCLOSURE STATEMENT

ATTY. DOCKET NO.	APPLICATION NO.
2005.0020003	09/604,097
INVENTOR: Yukio SHAKUDA	
FILING DATE: June 27, 2000	ART UNIT: 2828

FOREIGN PATENT DOCUMENTS

EXAMINER INITIAL	DOC. REF.	DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUB-CLASS	TRANSLATION
	AA						N/A
	AB						N/A
	AC						N/A
	AD						N/A

OTHER (Including Author, Title, Date, Pertinent Pages, etc.)

TN	AE70	Stockman, S.A. and Stillman, G.E., "Hydrogen in III-V Device Structures," *Materials Science Forum*, Vols. 148-149, Trans Tech Publications, Switzerland, pp. 501-524, 529-531, 534 and 535 (1994).
	AF70	Bykhovski, A. *et al.*, "Strain and charge distribution in GaN-AlN-GaN semiconductor-insulator-semiconductor structure for arbitrary growth orientation," *Applied Physics Letters*, Vol. 63, No. 16, American Institute of Physics, pp. 2243 and 2245 (October 18, 1993).
	AG70	Wickenden, D.K. *et al.*, "High quality self-nucleated $Al_xGa_{1-x}N$ layers on (00.1) sapphire by low-pressure metalorganic chemical vapor deposition," *Applied Physics Letters*, Vol. 65, No. 16, American Institute of Physics, pp. 2024 and 2026 (October 17, 1994).
	AH70	
	AI70	
	AJ70	
	AK70	

EXAMINER: Tuan Nguyen

DATE CONSIDERED: 8/27/04

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

SHEET 1 OF 3

ATTORNEY'S DKT NO.	APPLICATION NO.
033022-004	09/604,097
APPLICANT	
Yukio Shakuda	
FILING DATE	GROUP
June 27, 2000	2874

U.S. PATENT DOCUMENTS

Examiner Initials	U.S. Patent Document Number	Kind Code (if known)	Name of Patentee or Applicant of Cited Document	Date of Publication (MM-DD-YYYY)
TN	4,268,842		Jacob et al.	05/19/1981
	5,006,908		Matsuoka et al.	04/09/1991
	5,227,328		Khan et al.	07/13/1993
	4,144,116		Jacob et al.	07/13/1979
	5,252,499		Rothschild	03/13/1979
	4,904,618		Neumark	10/12/1993
				02/27/1990

FOREIGN PATENT DOCUMENTS

Examiner Initials	Foreign Patent Document Number	Kind Code (if known)	Country	Date of Publication (MM-DD-YYYY)	Translation Yes	Translation no
TN	0 483 688 A2		Europe	05/06/1992		
	0 541 373 B1		Europe	09/30/1998		
	WO 96/11498		WIPO	04/18/1996		

NON PATENT LITERATURE DOCUMENTS

Examiner Initials	Include name of author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.
TN	NAKAMURA et al., "Thermal Annealing Effect of P-Type Mg-Doped GaN Films", Jpn. J. Appl. Phys. Vol. 31, (1992), pp. L139-L142
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Examiner Signature	Tuan Nguyen	Date Considered	8/27/04

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Substitute for form 1449A/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

ATTORNEY'S DKT NO.	APPLICATION NO.
033022-004	09/604,097
APPLICANT: Yukio Shakuda	
FILING DATE: June 27, 2000	GROUP: 2874

U.S. PATENT DOCUMENTS

Examiner Initials	U.S. Patent Document Number	Kind Code (if known)	Name of Patentee or Applicant of Cited Document	Date of Publication (MM-DD-YYYY)
TN	6,084,899		Shakuda	07/04/2000
	6,115,399		Shakuda	09/05/2000

FOREIGN PATENT DOCUMENTS

Examiner Initials	Foreign Patent Document Number	Kind Code (if known)	Country	Date of Publication (MM-DD-YYYY)	Translation Yes	Translation no

NON PATENT LITERATURE DOCUMENTS

Examiner Initials	Include name of author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.
TN	NEUMARK, "Effect of deep levels on semiconductor carrier concentrations in the case of "strong" compensation", pp. 2250-2252, Physical Review B, Vol. 26, No. 4, , 1982 The American Physical Society
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	ZYKOV et al., "Influence of Temperature on the Luminescence Bands of Gallium Nitride", Soviet Physics - Semiconductor, Vol. 6, No. 1, pp. 154-156, July 1972

Examiner Signature	Tuan Nguyen	Date Considered	8/27/04

EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609; draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. SEND TO: Assistant Commissioner for Patents, Washington, D.C. 20231.

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SHEET 3 OF 3

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

ATTORNEY'S DKT NO.	APPLICATION NO.
033022-004	09/604,097
APPLICANT: Yukio Shakuda	
FILING DATE: June 27, 2000	GROUP: 2874

U.S. PATENT DOCUMENTS

Examiner Initials	U.S. Patent Document Number	Kind Code (if known)	Name of Patentee or Applicant of Cited Document	Date of Publication (MM-DD-YYYY)

FOREIGN PATENT DOCUMENTS

Examiner Initials	Foreign Patent Document Number	Kind Code (if known)	Country	Date of Publication (MM-DD-YYYY)	Translation Yes	Translation no

NON PATENT LITERATURE DOCUMENTS

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TN	JACOB et al., "Gallium Nitride Emitting Devices Preparation and Properties", Journal of Electronic Materials, Vol. 7, No. 4, pp. 499-514, 1978 AIME
	PANKOVE et al., "Photoluminescence of Zn-implanted GaN", Appl. Phys. Lett., Vol. 24, No. 6, pp. 281-283, , March 15, 1974
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	Opposition papers of EP Patent Application No. 923101323
	Notice of Opposition of EP 0.541.373, filed June 30, 1999 in EP Patent Office
	Response letter to Oppositions by A.A. Thornton & Co., dated March 3, 2000

Examiner Signature	Tran Nguyen	Date Considered	8/27/04

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FORM PTO-1449

FIFTH SUPPLEMENTAL INFORMATION DISCLOSURE STATEMENT

ATTY. DOCKET NO.	APPLICATION NO.
2005.0020003	09/604,097
APPLICANTS	
Yukio SHAKUDA	
FILING DATE	GROUP
June 27, 2000	2828

FOREIGN PATENT DOCUMENTS

EXAMINER INITIAL		DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUB-CLASS	TRANSLATION
TN	AA1	57-153479 A	09/1982	JP			Abstract Enclosed
	AB1	57-155793 A	09/1982	JP			Abstract Enclosed
	AC1	62-119196 A	05/1987	JP			Abstract Enclosed
	AD1	62-165948 A	07/1987	JP			Abstract Enclosed

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TN	AE1	Ando, T.,"Self-Consistent Results for a GaAs/$Al_xGa_{1-x}As$ Heterojunction. I. Subband Structure and Light Scattering Spectra", *J. Phys. Soc. Jpn. 51*, pp. 3893-3899 (1982).
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	AG1	Ando, T. and Mori, S., "Effective-Mass Theory of Semiconductor Heterojunctions and Superlattices," *Surf. Sci. 113*, pp. 124-130 (1982).
	AH1	Hedin, L. and Lundqvist, B.I., "Explicit local exchange-correlation potentials," *J. Phys. C: Solid St. Phys.*, Vol. 4, pp. 2064-2082 (1971).
	AI1	Ploog, K., "Molecule Beam Epitaxy of Artificially Layered III-V Semiconductors: Ultrathin-Layer $(GaAs)_m(AlAs)_m$ Superlattices and Delta (δ-) Doping in GaAs", *Physica Scripta*, Vol. T19, pp. 136-146 (1987).
	AJ1	Ploog, K., "Delta- (δ-) Doping In MBE-Grown GaAs: Concept and Device Application," *Journal of Crystal Growth 81*, North-Holland, pp. 304-313 (1987).
	AK1	Ogawa, M. and Baba, T., "Heavily Si-Doped GaAs and AlAs/n-GaAs Superlattice Grown by Molecular Beam Epitaxy," *Japanese Journal of Applied Physics*, Vol. 24, No. 8, pp. L572-L574 (August 1995).

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FORM PTO-1449

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FILING DATE: June 27, 2000	GROUP: 2828

FOREIGN PATENT DOCUMENTS

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TN	AA2	63-188977 A	08/1988	JP			Abstract Enclosed
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	AC2	63-222489 A	09/1988	JP			Abstract Enclosed
	AD2	1-14717 B2	03/1989	JP			Abstract Enclosed

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TN	AE2	Sasa, S. *et al.*, "Si Atomic-Planar-Doping in GaAs Made by Molecular Beam Epitaxy," *Japanese Journal of Applied Physics*, Vol. 24, No. 8, pp. L602-L604 (August 1995).
	AF2	Yao, T. *et al.*, "The effects of substrate temperature on the donor ionization energy and on the material properties of selectively doped short-period GaAs:Si/AlAs superlattices," *J. Appl. Phys. 62(5)*, American Institute of Physics, pp. 1925-1930 (September 1, 1987).
	AG2	Horikoshi, Y. *et al.*, "High-Mobility Two-Dimensional Electron Gas from Delta-Doped Asymmetric $Al_xGa_{1-x}As/GaAs/Al_yGa_{1-y}As$ Quantum Wells," *Japanese Journal of Applied Physics*, Vol. 26, No. 2, pp. 263-266 (February 1987).
	AH2	Ploog, K. *et al.*, "Improved electron mobility by AlAs spacer in one-sided selectively doped $Al_xGa_{1-x}As/GaAs$ multiple quantum well heterostructures," *Appl. Phys. Lett. 50 (18)*, American Institute of Physics, pp. 1237-1239 (May 4, 1987).
	AI2	Ploog, K., "GaAs Doping Superlattices A New Class of Semiconductor Materials Grown by Molecular Beam Epitaxy," *Collected Paper of MBE-CST-2*, Tokyo, pp. 17-20 (1982).
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TN	AA3	1-204425 A	08/1989	JP			Abstract Enclosed
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	AC3	2-291125 A	11/1990	JP			Abstract Enclosed
	AD3	3-80198 A	04/1991	JP			Abstract Enclosed

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TN	AE3	Baba, T. *et al.*, "AlAs/*n*-GaAs superlattice and its application to high-quality two-dimensional electron gas systems," *J. Appl. Phys. 59 (2)*, American Institute of Physics, pp. 526-532 (January 15, 1986).
	AF3	Street, R.A. *et al.*, "Luminescence of *n-i-p-i* heterostructures," *Physical Review B*, Vol. 33, No. 10, pp. 7043-7046 (May 15, 1986).
	AG3	Schubert, E.F. and Ploog, K., "Interpretation of Capacitance-Voltage Profiles from Delta-Doped GaAs Grown by Molecular Beam Epitaxy," *Japanese Journal of Applied Physics*, Vol. 25, No. 7, pp. 966-970 (July 1986).
	AH3	Nishikawa, Y. *et al.*, "MOCVD Growth Of InGaAlP Using Ethyldimethylindium As An In Source And Application To Visible-Region Lasers," *Journal of Crystal Growth 104*, Elsevier Science Publsihers B.V., pp. 245-249 (1990).
	AI3	Miller, L.M. *et al.*, "Characteristics of step-graded separate confinement quantum well lasers with direct and indirect barriers," *J. Appl. Phys. 68 (5)*, American Institute of Physics, pp. 1964-1967 (September 1, 1990).
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TN	AA4	3-31678 B2	05/1991	JP			Abstract Enclosed
	AB4	3-252176 A	11/1991	JP			Abstract Enclosed
	AC4	3-252177 A	11/1991	JP			Abstract Enclosed
	AD4	3-252178 A	11/1991	JP			Abstract Enclosed

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TN	AE4	Sandroff, C.J. *et al.*, "Dramatic enhancement in the gain of a GaAs/AlGaAs heterostructure bipolar transistor by surface checmical passivation," *Appl. Phys. Lett. 51 (1)*, American Institute of Physics, pp. 33-35 (July 6, 1987).
	AF4	Takado, N. *et al.*, "Chemically enhanced focused ion beam etching of deep grooves and laser-mirror facets in GaAs under Cl_2 gas irradiation using a fine nozzle," *Appl. Phys. Lett. 50(26)*, American Institute of Physics, pp. 1891-1893 (June 29, 1987).
	AG4	Ohba, Y. and Hatano, A., "H-Atom Incorporation in Mg-Doped GaN Grown by Metalorganic Chemical Vapor Deposition," *Jpn. J. Appl. Phys.*, Vol. 33, Part 2, No. 10A, pp. L1367-L1369 (October 1, 1994).
	AH4	Olszakier, M. *et al.*, "Photoinduced Intersubband Absorption in Undoped Multi-Quantum-Well Structures," *Physical Review Letters*, Vol. 62, No. 25, pp. 2997-3000 (June 19, 1989).
	AI4	Seilmeier, A. *et al.*, "Direct Observation of Intersubband Relaxation in Narrow Multiple Quantum Well Structures," *Solid-State Electronics*, Vol. 31, No. ¾, Pergamon Journals Ltd., pp. 767-770 (1988).
	AJ4	Yang, C. and Pan, D., "Intersubband absorption of silicon-based quantum wells for infrared imaging," *J. Appl. Phys. 64(3)*, American Institute of Physics, pp. 1573-1575 (August 1, 1988).
	AK4	Andersson, J.Y. and Landgren, G., "Intersubband transitions in single AlGaAs/GaAs quantum wells studied by Fourier transform infrared spectroscopy," *J. Appl. Phys. 64(8)*, American Institute of Physics, pp. 4123-4127 (October 15, 1988).

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TN	AA5	4-10665 A	01/1992	JP			Abstract Enclosed
	AB5	4-15200 B2	03/1992	JP			Abstract Enclosed
	AC5	4-163968 A	06/1992	JP			Abstract Enclosed
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TN	AE5	Goldberg, B.B. *et al.*, "Inelastic Light Scattering Of Valence Subband Transitions In GaAs/GaAlAs Multiple Quantum Wells," *Surface Science 196*, Elsevier Science Publishers B.V., pp. 619-625 (1988).
	AF5	Julien, F.H. *et al.*, "Optical saturation of intersubband absorption in GaAs-$Al_xGa_{1-x}As$ quantum wells," *Appl. Phys. Lett. 53(2)*, American Institute of Physics, pp. 116-118 (July 11, 1988).
	AG5	Goossen, K.W. *et al.*, "Conduction-band offset determination in GaAs-$Al_xGa_{1-x}As$ through measurement of infrared internal photoemission," *Physical Review B*, Vol. 36, No. 17, The American Physical Society, pp. 9370-9373 (December 15, 1987).
	AH5	Kastalsky, A. *et al.*, "Photovoltaic detection of infrared light in a GaAs/AlGaAs superlattice," *Appl. Phys. Lett. 52(16)*, American Institute of Physics, pp. 1320-1322 (April 18, 1988).
	AI5	Bäuerle, R.J. *et al.*, "Picosecond infrared spectroscopy of hot carriers in a modulation-doped $Ga_{0.47}In_{0.53}As$ multiple-quantum-well structure," *Physical Review B*, Vol. 38, No. 6, The American Physcial Society, pp. 4307-4310 (August 15, 1988).
	AJ5	Seilmeier, A. *et al.*, "Intersubband Relaxation in GaAs-$Al_xGa_{1-x}As$ Quantum Well Structures Observed Directly by an Infrared Bleaching Techniques," *Physical Review Letters*, Vol. 59, No. 12, The American Physical Society, pp. 1345-1348 (September 21, 1987).
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TN	AA6	4-163971 A	06/1992	JP			Abstract Enclosed
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TN	AE6	Seilmeier, A. *et al.*, "Picosecond Intersubband Spectroscopy," *Superlattices and Microstructures*, Vol. 5, No. 4, Academic Press Limited, pp. 569-574 (1989).
	AF6	Kane, M.J. *et al.*, "Intersubband Absorption and Infrared Modulation in GaAs/AlGaAs Single Quantum Wells," *Superlattices and Microstructures*, Vol. 5, No. 4, Academic Press Limited, pp. 587-589 (1989).
	AG6	Asai, H. *et al.*, "Structure Dependence of Intersubband Absorption in InGaAs/InAlAs Multiquantum Wells," 6 pages.
	AH6	Zhou, X. *et al.*, "Intersubband absorption in strained $In_xGa_{1-x}As/Al_{0.4}Ga_{0.6}As(0\leq x\leq 0.15)$ multiquantum wells," *Appl. Phys. Lett. 54(9)*, American Institute of Physics, pp. 855-856 (February 27, 1989).
	AI6	Rosencher, E. *et al.*, "Observation of nonlinear optical rectification at 10.6 μm in compositionally asymmetrical AlGaAs multiquantum wells," *Appl. Phys. Lett. 55(16)*, American Institute of Physics, pp. 1597-1599 (October 16, 1989).
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	AK6	Walrod, D. *et al.*, "Optical nonlinearities due to subband structures in $Al_{0.08}In_{0.92}Sb$/InSb superlattices," *Appl. Phys. Lett. 56(3)*, American Institute of Physics, pp. 218-220 (January 15, 1990).

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TN	AE7	Kinch, M.A. and Yariv, A., "Performance limitations of GaAs/AlGaAs infrared superlattices," *Appl. Phys. Lett. 55 (2)*, American Institute of Physics, pp. 2093-2095 (November 13, 1989).
	AF7	West, L.C. and Eglash, S.J., "First observation of an extremely large-dipole infrared transition within the conduction band of a GaAs quantum well," *Appl. Phys. Lett. 46(12)*, American Instititute of Physics, pp. 1156-1158 (June 15, 1985).
	AG7	Nakayama, M. *et al.*, "Intersubband transitions in GaAs-$Al_xGa_{1-x}As$ modulation-doped superlattices," *Appl. Phys. Lett. 51(21)*, American Institute of Physics, pp. 1741-1743 (November 23, 1987).
	AH7	Allmen, P.v. *et al.*, "Intersubband Absorption In GaAs/AlGaAs Quantum Wells Between 4.2K and Room Temperature," *Superlattics and Microstructures*, Vol. 5, No. 2, Academic Press Limited, pp. 259-263 (1989)
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	AK7	Elsnesser, T. *et al.*, "Picosecond Infrared Spectroscopy of Hot Carriers in a Modulation-Doped $Ga_{0.47}In_{0.53}As$ Multiple-Quantum-Well Structure," pp. 388-389 (July 19, 1988).

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	AB8	5-21846 A	01/1993	JP			Abstract Enclosed
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TN	AE8	Oberli, D.Y. *et al.*, "Intersubband Relaxation of Photoexcited Hot Carriers In Quantum Wells," *Solid-State Electronics*, Vol. 31, No. ¾, Pergamon Journals Ltd., pp. 413-418 (1988).
	AF8	Asai, H. *et al.*, "[LN-3] 3.2 μm Intersubband Absorption In Strained InGaAs/InAlAs Multiquantum Wells," p. 8.
	AG8	Olszakier, M. *et al.*, "Intersubband Spectroscopy In *GaAs/GaAlAs* Multi-Quantum-Well Structures: Photoinduced Absorption," *Superlattices and Microstructures*, Vol. 5, No. 5, Academic Press Limited, pp. 283-286 (1989).
	AH8	Ahn, D. and Chuang, S.L., "Electric-Field Dependence of the Intersubband Optical Absorption in a Semiconductor Quantum Well," *Superlattices and Microstructures*, Vol. 4, No. 2, Academic Press Limited, pp. 153-157 (1988).
	AI8	Ahn, D. ad Chuang, S.L., "Calculation of Linear and Nonlinear Intersubband Optical Absorptions in a Quantum Well Model with an Applied Electric Field," *IEEE Journal of Quantum Electronics*, Vol. QE-23, No. 12, IEEE, pp. 2196-2204 (December 1987).
	AJ8	Newson, D.J. and Kurobe, A., "Possiblity of optical bistability due to resonant intersubband excitation in stepped modulation-doped quantum wells," *Appl. Phys. Lett. 51(21)*, American Institute of Physics, pp. 1670-1672 (November 23, 1987).
	AK8	Bandara, K.M.S.V. *et al.*, "Exchange interactions in quantum well subbands," *Appl. Phys. Lett. 53(20)*, American Institute of Physics, pp. 1931-1933 (November 14, 1988).

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TN	AE9	Luryi, S., "Photon-Drag Effect in Intersubband Absorption by a Two-Dimenstional Electron Gas," *Physical Review Letters*, Vol. 58, No. 21, The American Physical Society, pp. 2263-2266 (May 25, 1987).
	AF9	Yuh, P.F. and Wang, K.L., "Novel infrared band-aligned superlattice laser," *Appl. Phys. Lett. 51(18)*, American Institute of Physics, pp. 1404-1406 (November 2, 1987).
	AG9	Newson, D.J. and Kurobe, A., "Simulation of Saturation and Relaxation of Intersubband Absorption in Doped Quantum Wells," *IQEC '88*, pp. 46-47.
	AH9	Newson, D.J. and Kurobe, A., "Optical Nonlinearity Due to Resonant Intersubband Transitions in Doped Quantum Wells," *Nonlinear Optics of Organics and Semiconductors*, 8 pages.
	AI9	Newson, D.J. and Kurobe, A., "The effect of conduction band non-parabolicity on inter-sub-band absorption in doped quantum wells," *Semicond. Sci. Technol. 3*, IOP Publishing Ltd., pp. 786-790 (1988).
	AJ9	Gomes, V.M.S. *et al.*, "Intersubband Transition Energies in Quantum Wells in *n*-Type GaAs-$Al_xGA_{1-x}As$ Heterostructures," *International Journal of Quantum Chemistry*, Vol. XXXII, John Wiley & Sons, Inc., pp. 655-661 (1987).
	AK9	Tsang, L. *et al.*, "Electric field control of optical second-harmonic generation in a quantum well," *Appl. Phys. Lett. 52(9)*, American Institute of Physics, pp. 697-699 (February 29, 1988).

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TN	AE10	Ahn, D. and Chuang, S.L., "Nonlinear intersubband optical absorption in a quantum well with an applied electric field," abstract from the October 18-23, 1997 Annual Meeting of the Optical Society of America, 1 page.
	AF10	Yoo, S.J.B. *et al.*, "Second harmonic generation in dc-biased quantum wells," abstract from the October 18-23, 1997 Annual Meeting of the Optical Society of America, 1 page.
	AG10	Ahn, D. and Chuang, S.L., "Intersubband optical absorption in a quantum well with an applied electric field," *Physical Review B*, Vol. 35, No. 8, The American Physical Society, pp. 4149-4151 (March 15, 1987).
	AH10	Anderson, N.G. *et al.*, "Optical characterization of pseudomorphic $In_xGa_{1-x}As$-GaAs single-quantum-well heterostructures," *J. Appl. Phys. 60(7)*, pp. 2361-2367 (October 1, 1986).
	AI10	Ji, G. *et al.*, "Optical investigation of highly strained InGaAs-GaAs multiple quantum wells," *J. Appl. Phys. 62(8)*, American Institute of Physics, pp. 3366-3373 (October 15, 1987).
	AJ10	Arent, D.J. *et al.*, "Strain effects and band offsets in GaAs/InGaAs strained layered quantum structures," *J. Appl. Phys. 66(4)*, American Institute of Physics, pp. 1739-1747 (August 15, 1989).
	AK10	Yu, P.W. *et al.*, "Photocurrent spectroscopy of $In_xGa_{1-x}As$/GaAs multiple quantum wells," *Appl. Phys. Lett. 54(22)*, American Institute of Physics, pp. 2230-2232 (May 29, 1989).

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TN	AE11	Watson, R.F. *et al.*, "Shattering The Quartz Muffle Myth," pp. 194-202.
	AF11	Bertolet, D.C. *et al.*, "Pseudomorphic GaAs/InGaAs single quantum wells by atmospheric pressure organometallic chemical vapor deposition," *Appl. Phys. Lett. 52(4)*, American Institute of Physics, pp. 293-295 (January 25, 1988).
	AG11	Quillec, M. *et al.*, "Growth conditions and characterization of InGaAs/GaAs strained layers superlattices," *J. Appl. Phys. 55(8)*, American Institute of Physics, pp. 2904-2909 (April 15, 1984).
	AH11	Niki, S. *et al.*, "Band-edge discontinuities of strained-layer $In_xGa_{1-x}As/GaAs$ heterojunctions and quantum wells," *Appl. Phys. Lett. 55(13)*, American Institute of Physics, pp. 1339-1341 (September 25, 1989).
	AI11	Marzin, J.-Y. *et al.*, "Optical investigation of a new type of valence-band configuration in $In_xGa_{1-x}As$-GaAs strained superlattices," *Physical Review B*, Vol. 31, No. 12, The American Physical Society, pp. 8298-8301 (June 15, 1985).
	AJ11	Menéndez, J. *et al.*, "Large valence-band offset in strained-layer $In_xGa_{1-x}As$-GaAs quantum wells," *Phsycial Review B*, Vol. 36, No. 15, pp. 8165-8168 (November 15, 1987).
	AK11	Liu, C.T. *et al.*, "Cyclotron resonance measurements of electron effective mass in strained AlGaAs/InGaAs/GaAs pseudomorphic structures," *Appl. Phys. Lett. 53(25)*, American Institute of Physics, pp. 2510-2512 (December 19, 1988).

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TN	AA12	5-243613 A	09/1993	JP			Abstract Enclosed
	AB12	5-73252 B2	10/1993	JP			Abstract Enclosed
	AC12	5-291621 A	11/1993	JP			Abstract Enclosed
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TN	AE12	Suemune, I. *et al.*, "Extremely wide modulation bandwidth in a low threshold current strained quantum well laser," *Appl. Phys. Lett. 53(15)*, American Institute of Physics, pp. 1378-1380 (October 10, 1988).
	AF12	Priester, C. *et al.*, "Theoretical calculation of band-edge discontinuities near a strained heterojunction: Application to (In,Ga)As/GaAs" *Physical Review B*, Vol. 38, No. 14, The American Physical Society, pp. 9870-9873 (November 15, 1988).
	AG12	Andersson, T.G. *et al.*, "Photoluminescence and photoconductivity measurements on band-edge offsets in strained molecular-beam-epitaxy-grown $In_xGa_{1-x}As$/GaAs quantum wells," *Physical Review B*, Vol. 37, No. 8, The American Physical Society, pp. 4032-4038 (March 15, 1988).
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	AI12	Scott, E.G. *et al.*, "Improvements to and characterization of GaInAs/AlInAs heterointerfaces grown by molecular-beam epitaxy," *J. Vac. Sci. Technol. B 6(2)*, American Vacuum Society, pp. 603-606 (March/April 1988).
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	AK12	Jeong, J. *et al.*, "An investigation of $In_xGa_{1-x}As$/GaAs quantum wells grown by molecular-beam epitaxy," *J. Appl. Phys. 63(11)*, American Institute of Physics, pp. 5464-5468 (June 1, 1988).

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TN	AE13	Yao, J.Y. *et al.*, "Structure of lattice-strained $In_xGa_{1-x}As/GaAs$ layers studied by transmission electron microscopy," *Appl. Phys. Lett. 53(15)*, American Institute of Physics, pp. 1420-1422 (October 10, 1988).
	AF13	Bedair, S.M. *et al.*, "Defect reduction in GaAs grown by molecular beam epitaxy using different superlattice structures," *Appl. Phys. Lett. 49(15)*, American Institute of Physics, pp. 942-944 (October 13, 1986).
	AG13	Coronado, M. L. *et al.*, "Indium Isoelectronic Doping Influence on Etch Pit Density in GaAs Layers Grown by Vapour Phase Epitaxy," *Japanese Journal of Applied Physics*, Vol. 25, No. 11, pp. L899-L901 (November 1986).
	AH13	Wood, C.E.C. *et al.*, "State-of-the-art AlGaAs alloys by antimony doping," *J. Appl. Phys. 60(4)*, American Institute of Physics, pp. 1300-1305 (August 15, 1986).
	AI13	Missous, M. *et al.*, "Electrical Properties of Indium Doped GaAs Layers Grown by MBE," *Journal of Crystal Growth 81*, Elsevier Science Publishers B.V., pp. 314-318 (1987).
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TN	AE14	Bhattacharya, P.K. *et al.*, "Low defect densities in molecular beam epitaxial GaAs achieved by isoelectronic In doping," *Appl. Phys. Lett. 49(8)*, American Institute of Physics, pp. 470-472 (August 25, 1986).
	AF14	Beneking, H. and Emeis, N., "Minority Carrier Lifetime Improvement by Single Strained Layer Epitaxy of InP," *IEEE Electron Device Letters*, Vol. EDL-7, No. 2, IEEE, pp. 98-100 (February 1986).
	AG14	Narozny, P. and Beneking, H., "High-Quality GaAs Schottky Diodes Fabricated By Strained Layer Epitaxy," *Electronics Letters*, Vol. 21, No. 22, pp. 1050-1051 (October 24, 1985).
	AH14	Beneking, H. *et al.*, "Enhanced Carrier Lifetime and Diffusion Length in GaAs by Strained-Layer MOCVD," *IEEE Electron Device Letters*, Vol. EDL-7, No. 2, IEEE, pp. 101-103 (February 1986).
	AI14	Andersson, T.G. *et al.*, "Variation of the critical layer thickness with In content in strained $In_xGa_{1-x}As$-GaAs quantum wells grown by molecular beam epitaxy," *Appl. Phys. Lett. 51(10)*, American Institute of Physics, pp. 752-754 (September 7, 1987).
	AJ14	Fritz, I.J. *et al.*, "Critical layer thickness in $In_{0.2}Ga_{0.8}As$/GaAs single strained quantum well structures," *Appl. Phys. Lett. 51(13)*, American Institute of Physics, pp. 1004-1006 (September 28, 1987).
	AK14	Gourley, P.L. *et al.*, "Controversy of critical layer thickness for InGaAs/GaAs strained-layer epitaxy," *Appl. Phys. Lett. 52(5)*, American Institute of Physics, pp. 377-379 (February 1, 1988).

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TN	AE15	Joyce, M.J. *et al.*, "Concentration-dependent band offset in $In_xGa_{1-x}As/GaAs$ strained quantum wells," *Physical Review B*, Vol. 38, No. 15, The American Physical Society, pp. 10978-10980 (November 15, 1988).
	AF15	Laurich, B.K. *et al.*, "Study of the Optical Properties of (100) and (111) Oriented GaInAs/GaAs Strained-Layer Superlattices," 12 pages (appears to be dated August 9, 1988).
	AG15	Raymond, A. *et al.*, "The electron effective mass in heavily doped GaAs," *J. Phys. C: Solid State Phys.*, Vol. 12, The Institute of Physics, pp. 2289-2293 (1979).
	AH15	Bandara, K.M.S.V. *et al.*, "Erratum: Exchange interactions in quantum well subbands [Appl. Phys. Lett. 53, 1931 (1988)]," *Appl. Phys. Lett. 55(2)*, American Institute of Physics, p. 206 (July 10, 1989).
	AI15	Nelson, D.F. *et al.*, "Band nonparabolicity effects in semiconductor quantum wells," *Physical Review B*, Vol. 35, No.14, pp. 7770-7773 (May 15, 1987).
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	AK15	Yoo, K.H. *et al.*, "Effect of nonparabolicity in $GaAs/Ga_{1-x}Al_xAs$ semiconductor quantum wells," *Physical Review B*, Vol. 39, No. 17, The American Physical Society, pp. 12808-12813 (June 15, 1989).

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TN	AE16	Bastard, G., "Theoretical investigations of superlattice band structure in the envelope-function approximation," *Physical Review B*, Vol. 25, No. 12, The American Physical Society, pp. 7584-7597 (June 15, 1982).
	AF16	Oing, Y. and Chu-liang, Y., "The effect of complex band structure and non-parabolicity on sub-bands of GaAs-$Al_xGa_{1-x}As$ heterostructures: band offset," *J. Phys. C: Solid State Phys. 20*, IOP Publishing Ltd., pp. 5125-5134 (1987).
	AG16	Bastard, G., "Superlattice band structure in the envelope-function approximation," *Physical Review B*, Vol. 24, No. 10, The American Physical Society, pp. 5693-5697 (November 15, 1981).
	AH16	Dingle, R., "Confined Carrier Quantum States in Ultrathin Semiconductor Heterostructures," pp. 21-48.
	AI16	Shakuda, Y. and Katahama, H., "Intersubband Absorption in $In_{0.15}Ga_{0.85}As/Al_{0.35}Ga_{0.65}As$ Multiple Quantum Wells", *Japanese Journal of Applied Physics*, Vol. 29, No. 4, pp. L552-L555 (April 1990).
	AJ16	Lin, M.E. *et al.*, "Low resistance ohmic contacts on wide band-gap GaN," *Appl. Phys. Lett. 64(8)*, American Institute of Physics, pp. 1003-1005 (February 21, 1994).
	AK16	*Nichia Product Guide: NSPB Series (Blue)/NSPG Series (Green)/ NSPW Series (White)*, Nichia Chemical Industries, Ltd., 6 pages.

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TN	AA17	6-151963 A	05/1994	JP			Abstract Enclosed
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TN	AE17	Klaasen, J.J. *et al.*, "High Temperature GaN and $Al_xGa_{1-x}N$ Photovoltaic Detectors fr UV Sensing Applications," 2 pages.
	AF17	Khan, M.A. *et al.*, "Metal semiconductor field effect transistor based on single crystal GaN," *Appl. Phys. Lett. 62(15)*, American Institute of Physics, pp. 1786-1787 (April 12, 1993).
	AG17	Nakamura, S., "InGaN/AlGaN blue-light-emitting diodes," *J. Vac. Sci. Technol. A 13(3)*, American Vacuum Society, pp. 705-710 (May/June 1995).
	AH17	Suzuki, M. and Uenoyama, T., "First-principles calculations of effective-mass parameters of AlN and GaN," *Physical Review B*, Vol. 52, No. 11, The American Physical Society, pp. 8312-8139 (September 15, 1995).
	AI17	Uenoyama, T. and Suzuki, M., "Valence subband structures of wurtzite GaN/AlGaN quantum wells," *Appl. Phys. Lett. 67 (17)*, American Institute of Physics, pp. 2527-2529 (October 23, 1995).
	AJ17	Hartman, R.L. *et al.*, "Pulsations and absorbing defects in (Al, Ga)As injection lasers," *J. Appl. Phys. 50(7)*, American Institute of Physics, pp. 4616-4619 (July 1979).
	AK17	Tsang, W.T., "The influence of bulk nonradiative recombination in the wide band-gap regions of moleular beam epitaxially grown GaAs-$Al_xGa_{1-x}As$ DH lasers," *J. Appl. Phys. 33(3)*, American Institute of Physics, pp. 245-248 (August 1, 1978).

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TN	AA18	6-151967 A	05/1994	JP			Abstract Enclosed
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TN	AE18	Chinone, N. *et al.*, "Mode-Hopping Noise in Index-Guided Semiconductor Lasers and Its Reduction by Saturable Absorbers," *IEEE Journal of Quantum Electronics*, Vol. QE-21, No. 8, IEEE, pp. 1264-1270 (August 1985).
	AF18	Fukui, T. and Horikoshi, Y., "Organometallic VPE Growth of $InAs_{1-x}Sb_x$ on InAs," *Japanese Journal of Applied Physics*, Vol. 19, No. 1, pp. L53-L56 (January 1980).
	AG18	Misawa, S. *et al.*, "Influence of Ga Sources on Impurity Doping in Gas Source MBE GaAs," *Japanese Journal of Applied Physics*, Vol. 26, No. 7, pp. 1088-1091 (July 1987).
	AH18	Tsang, W.T., "Very low current threshold $GaAs/Al_{0.5}Ga_{0.5}As$ double-heterostructure lasers grown by chemical beam epitaxy," *Appl. Phys. Lett. 48(8)*, American Institute of Physics, pp. 511-513 (February 24, 1986).
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	AK18	Yamamoto, S. and Hijikata, T., "Continuous control of coherence length in separately pumped (AlGa)As lasers," *Appl. Phys. Lett. 49(18)*, American Institute of Physics, pp. 1129-1131 (November 3, 1986).

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TN	AE19	Yonezu, H. *et al.*, "A GaAs-$Al_xGa_{1-x}As$ Double Heterostructure Planar Stripe Laser," *Japanese Journal of Applied Physics*, Vol. 12, No. 10, pp. 1585-1592 (October 1973).
	AF19	Mamine, T. *et al.*, "Analysis of astigmatism of gain guided laser with a tapered-stripe geometry," *J. Appl. Phys. 56(11)*, American Institute of Physics, pp. 3116-3120 (December 1, 1984).
	AG19	Mamine, T., "Astigmatism and spontaneous emission factor of laser diodes with parabolic gain," *J. Appl. Phys. 54(4)*, American Institute of Physics, pp. 2103-2105 (April 1983).
	AH19	Mamine, T. *et al.*, "New class of gain guided laser with a tapered-stripe structure," *J. Appl. Phys. 54(8)*, American Institute of Physics, pp. 4302-4304 (August 1983).
	AI19	Casey Jr., H.C. *et al.*, "GaAs-$Al_xGa_{1-x}As$ heterostructure laser with separate optical and carrier confinement," *Journal of Applied* Physics, Vol. 45, No. 1, American Institute of Physics, pp. 322-333 (January 1974).
	AJ19	Goldstein, B. *et al.*, "A high-power channeled-substrate-planar AlGaAs laser," *Appl. Phys. Lett. 47(7)*, American Institute of Physics, pp. 655-657 (October 1, 1985).
	AK19	Olsen, G.H. and Ettenberg, M., "Universal stain/etchant for interfaces in III-V compounds," *Journal of Applied Physics*, Vol. 45, No. 11, American Institute of Physics, pp. 5112-5114 (November 1974).

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TN	AE20	Logan, R.A. and Reinhart, F.K., "Optical waveguides in GaAs-AlGaAs epitaxial layers," *J. Appl. Phys.*, Vol. 44, No. 9, American Institute of Physics, pp. 4172-4176 (September 1973).
	AF20	Fujiwara, K. and Ploog, K., "Photoluminescence of GaAs single quantum wells confined by short-period all-binary GaAs/AlAs supterlattices," *Appl. Phys. Lett. 45(11)*, American Institute of Physics, pp. 1222-1224 (December 1, 1984).
	AG20	Calleja, E. *et al.*, "Origin of the nonexponential thermal emission kinetics of *DX* centers in GaAlAs," *Appl. Phys. Lett. 49(11)*, American Institute of Physics, pp. 657-659 (September 15, 1986).
	AH20	Petrou, A., "Photoluminescence In GaAs/AlGaAs Quantum Wells Associated With Excited Confinement Subbands," *Solid State Communications*, Vol. 58, No. 9, Pergamon Journals Ltd., pp. 581-585 (1986).
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	AJ20	Semelius, B.E., "Band-gap shift in heavily doped *n*-type GaAs," *Physical Review B*, Vol. 33, No. 12, The American Physical Society, pp. 8582-8586 (June 15, 1986).
	AK20	Scolfaro, L.M.R. *et al.*, "Impurity levels induced by a C impurity in GaAs," *Physical Review B*, Vol. 34, No. 10, The American Physical Society, pp. 7135-7139 (November 15, 1986).

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TN	AE21	Masselink, W.T. *et al.*, "Shallow Impurity Levels In AlGaAs/GaAs Semiconductor Quantum Wells," *Solid State Electronics*, Vol. 29, No. 2, Pergamon Press Ltd., pp. 205-214 (1986).
	AF21	Wright, A.F. and Nelson, J.S., "Explicit treatment of the gallium 3*d* electrons in GaN using the plane-wave pseudopotential method," *Physical Review B*, Vol. 50, No. 4, The American Physical Society, pp. 2159-2165 (July 15, 1994).
	AG21	Nagahara, M. *et al.*, "Selective Growth of Cubic GaN in Small Areas on Patterned GaAs (100) Substrates by Metalorganic Vapor Phase Epitaxy," *Jpn. J. Appl. Phys.*, Vol. 33, Part 1, No. 1B, pp. 694-697 (January 1994).
	AH21	Kistenmacher, S. *et al.*, "Structural and electrical properties of reactively sputtered InN thin films on AlN-buffered (00.1) sapphire substrates: Dependence on buffer and film growth temperatures and thicknesses," *J. Appl. Phys. 74(3)*, American Institute of Physics, pp. 1684-1691 (August 1, 1993).
	AI21	Holmes, A.L. *et al.*, "X-ray diffracation studies of high-quality GaN heteroeptiaxial film grown by metal organic chemical vapour deposition," *Electronics Letters*, Vol. 30, No. 15, pp. 1252-1254 (July 21, 1994).
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TN	AE22	Sato, H. *et al.*, "Transparent and conductive impurity-doped GaN thin films prepared by an electron cyclotron resonance plasma metalorganic chemical vapor deposition method," *J. Appl. Phys. 75 (3)*, American Institute of Physics, pp. 1405-1409 (February 1, 1994).
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TN	AE23	Bhargava, R.N., "Blue And UV Light Emitting Diodes And Lasers," *Optoelectronics-Devices and Technologies*, Vol. 7 No. 1., MITA Press, pp. 19-47 (June 1992).
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TN	AE24	Shintani, A., "X-Ray Diffraction Topography and Crystal Characterization of GaN Epitaxial Layers for Light-Emitting Diodes," *J. Electrochem Soc.: Solid-State Science and Technology*, Vol. 125, No. 12, pp. 2076-2078 (December 1978).
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TN	AA25	6-314821 A	11/1994	JP			Abstract Enclosed
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TN	AE26	Giordana, A. *et al.*, "Modulated Reflectance and Absorption Characterization of Single Crystal GaN Films," *Journal of Electronic Materials*, Vol. 23, No. 6, pp. 509-512 (1994).
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	AI28	Honda, S. *et al.*, "Transverse-Mode Stabilised 630 nm-Band AlGaInP Strained Multiquandum-Well Laser Diodes Grown On Misoriented Substrates," *Electronics Letters*, Vol. 28, No. 14, PP. 1365-1367 (July 2, 1992).
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TN	AE29	Kamiyama, S. *et al.*, "Improvement of catastrophic optical damage level of AlGaInP visible laser didoes by sulfur treatment," *Appl. Phys. Lett. 58(23)*, American Institute of Physics, pp. 2595-2597 (June 10, 1991).
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	AH29	Ueno, Y. *et al.*, "30 mW 690 nm High-Power Strained Quantum Well AlGaInP Laser," *NEC Res. & Develop.*, Vol. 33, No. 3, pp. 393-400 (July 1992).
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TN	AE30	Wickenden, D.K. *et al.*, "Growth Of Epitaxial Layers Of Gallium Nitride On Silicon Carbide And Corundum Substrates," *Journal of Crystal Growth 9*, North-Holland Publishing Co., pp. 158-164 (1971).
	AF30	Norton, M.G. *et al.*, "Brazing of aluminium nitride substrates," *J. Mater. Res.*, Vol. 5, No. 10, pp. 2172-2176 (October 1990).
	AG30	Weber, J. and Singh, M., "Photoluminescence Detection Of Shallow Impurity Neutralization In III-V Compound Semiconductors," *Mat. Res. Soc. Symp. Proc.*, Vol. 104, Materials Research Society, pp. 325-329 (1988).
	AH30	Zanzucchi, P.J. *et al.*, "Optical Reflectance Method for Determining the Surface Quality of Sapphire (Al_2O_3)," *J. Electrochem. Soc.: Solid-State Sicence and Technology*, Vol. 125, No. 2, pp. 299-305 (February 1978).
	AI30	Vettiger, P. *et al.*, "Full-Wafer Technology-A New Approach to Large-Scale Laser Fabrication and Integration," *Journal of Quantum Electronics*, Vol. 27, No. 6, IEEE, pp. 1319-1331 (June 1991).
	AJ30	Matsuoka, T., "InGaAlN Growth," pp. 241-242.
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TN	AE31	Ponce, F.A., "Crystalline structure of AlGaN epitaxy on sapphire using AlN buffer layers," *Appl. Phys. Lett. 65(18)*, American Institute of Physics, pp. 2302-2304 (October 31, 1994).
	AF31	Khan, M.A. *et al.*, "GaN/AlN digital alloy short-period superlattices by switched atomic layer metalorganic chemical vapor deposition," *Appl. Phys. Lett. 63(25)*, American Institute of Physics, pp. 3470-3472 (December 20, 1993).
	AG31	Lin, M.E. *et al.*, "*p*-type zinc-blende GaN on GaAs substrates," *Appl. Phys. Lett. 63(7)*, American Institute of Physics, pp. 932-933 (August 16, 1993).
	AH31	Pearton, S.J. *et al.*, "Low bias electron cyclotron resonance plasma etching of GaN, AlN and InN," *Appl. Phys. Lett. 64(17)*, American Institute of Physics, pp. 2294-2296 (April 25, 1994).
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	AG32	Harris, G.L. *et al.*, "Beta Silicon Carbide Schottky Diode FET Inverters Grown on Silicon," 1 page.
	AH32	Wickenden, A.E. *et al.*, "The Effect of Thermal Annealing on GaN Nucleation Layers Deposited on (0001) Sapphire by Metalorganic Chemical Vapor Deposition," *J. Appl. Phys. (accepted for publication)*, 25 pages.
	AI32	Hwang, C.-Y., "Characteristics Of Gallium Nitride Grown On (0001) Sapphire By Plasma-Enhanced Atomic Layer Epitaxy," 5 pages (appears to have been published in 1993).
	AJ32	Wongchotigul, K. *et al.*, "Growth of Solid Solutions of Aluminum Nitride and Silicon Carbide in a Low Pressure Vertical Reactor MOCVD," 1 page.
	AK32	Hong, C.H. *et al.*, "GaN and AlN OMVPE Growth Using Phenylhydrazine," 2 pages.

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	APPLICANTS Yukio SHAKUDA	
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TN	AA33	7-235729 A	09/1995	JP			Abstract Enclosed
	AB33	7-83136 B2	09/1995	JP			Abstract Enclosed
	AC33	7-254733 A	10/1995	JP			Abstract Enclosed
	AD33	7-263748 A	10/1995	JP			Abstract Enclosed

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TN	AE33	Nihei, M. *et al.*, "Effect of Adding CO_2 to CH_4/H_2 Mixture for InGaAs/GaAs Selective Reactive Ion Etching," *Jpn. J. Appl. Phys.*, Vol. 34, Part 1, No. 12B, pp. 6819-6823 (December 1995).
	AF33	Pearton, S.J. *et al.*, "Reversible changes in doping of InGaAlN alloys induced by ion implantation or hydrogenation," *Appl. Phys. Lett. 63(8)*, American Institute of Physics, pp. 1143-1145 (August 23, 1993).
	AG33	Igarashi, O. "Heteroepitaxial Growth of $GaN_{1-x}P_x$ ($x \leq 0.09$) on Sapphire Substrates," *Jpn. J. Appl. Phys.*, Vol. 31, Part 1, No. 12A, pp. 3791-3793 (December 1992).
	AH33	Khan, M.A. *et al.*, "Low pressure metalorganic chemical vapor deposition of AlN over sapphire substrates," *Appl. Phys. Lett. 61(21)*, American Institute of Physics, pp. 2539-2541 (November 23, 1992).
	AI33	Wakahara, A. *et al.*, "Epitaxial Growth Of Indium Nitride," *Journal of Crystal Growth 99*, Elsevier Science Publishers B.V., pp. 385-389 (1990).
	AJ33	Sakai, S. *et al.*, "Band Gap Energy and Band Lineup of III-V Alloy Semiconductors Incorporating Nitrogen and Boron," *Jpn. J. Appl. Phys.*, Vol. 32, Part 1, No. 10, pp. 4413-4417 (October 1993).
	AK33	Miyoshi, S. *et al.*, "MOVPE growth of cubic GaN on GaAs using dimethyhydrazine," *Journal of Crystal Growth 124*, Elsevier Science Publishers B.V., pp. 439-442 (1992).

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TN	AA34	7-263749 A	10/1995	JP			Abstract Enclosed
	AB34	7-273069 A	10/1995	JP			Abstract Enclosed
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TN	AE34	Yung, K. *et al.*, "Observation of stimulated emission in the near ultraviolet from a molecular beam epitaxy grown GaN film on sapphire in a vertical-cavity, singel pass configuration," *Appl. Phys. Lett. 64(9)*, American Institute of Physics, pp. 1135-1137 (February 28, 1994).
	AF34	Sun, C.-J. and Razeghi, M., "Comparison of the physical properties of GaN thin films deposited on (0001) and (0112) sapphire substrates," *Appl. Phys. Lett. 63(7)*, American Institute of Physics, pp. 973-975 (August 16, 1993).
	AG34	Miyauchi, M. *et al.*, "Growth of Aluminum Nitride Films on Silicon by Electron-Cyclotron-Resonance-Assisted Molecular Beam Epitaxy," *Jpn. J. Appl. Phys.*, Vol. 31, Part 2, No. 12A, pp. L1714-L1717 (December 1, 1992).
	AH34	Singh, R. *et al.*, "Intensity dependence of photoluminescence in GaN thin films," *Appl. Phys. Lett. 64(3)*, American Institute of Physics, pp. 336-338 (January 17, 1994).
	AI34	Miura, Y. *et al.*, "New Epitaxial Growth Method of Cubic GaN on (100) GaAs Using $(CH_3)_3Ga$, HCl and NH_3," *Jpn. J. Appl. Phys.*, Vol. 34, Part 2, No. 4A, pp. L401-L404 (April 1, 1995).
	AJ34	Beresford, R. *et al.*, "Influence of substrate electrical bias on the growth of GaN in plasma-assisted epitaxy," *J. Vac. Scie. Technol. B 13(2)*, American Vacuum Society, pp. 792-795 (March/April 1995).
	AK34	Lin, W.-T. *et al.*, "Epitaxial growth of cubic AlN films on (100) and (111) silicon by pulsed laser ablation," *Appl. Phys. Lett. 66(16)*, American Institute of Physics, pp. 2066-2068 (April 17, 1995).

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TN	AA35	7-297446 A	11/1995	JP			Abstract Enclosed
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TN	AE35	Zhang, W. *et al.*, "Preparation of epitaxial AlN films by electron cyclotron resonance plasma-assisted chemical vapor deposition on Ir- and Pt-coated sapphire substrates," *Appl. Phys. Lett. 64(11)*, American Institute of Physics, pp. 1359-1361 (March 14, 1994).
	AF35	Kim, K. *et al.*, "Growth and characterization of GaN on sapphire (0001) using plasma-assisted ionized source beam epitaxy," *J. Vac. Sci. Technol. B 13(2)*, American Vacuum Society, pp. 796-799 (March/April 1995).
	AG35	Qiu, C.H. *et al.*, "Study of defect states in GaN films by photoconductivity measurement," *Appl. Phys. Lett. 66(20)*, American Institute of Physics, pp. 2712-2714 (May 15, 1995).
	AH35	Meney, A.T. *et al.*, "Theory of optical gain in ideal GaN heterostructure lasers," *Appl. Phys. Lett. 67(20)*, American Institute of Physics, pp. 3013-3015 (November 13, 1995).
	AI35	Qian, W. *et al.*, "Open-core screw dislocations in GaN epilayers observed by scanning force microscopy and high-resolution transmission electron microscopy," *Appl. Phys. Lett. 67(16)*, American Institute of Physics, pp. 2284-2286 (October 16, 1995).
	AJ35	Lee, S.S. *et al.*, "Single-phase Deposition of α-Gallium Nitride by a Laser-induced Transport Process," *J. Mater. Chem.*, Vol. 3, pp. 347-351 (1993).
	AK35	Ho, K.-L. *et al.*, "MOVPE of AlN and GaN by using novel precursors," *Journal of Crystal Growth 107*, Elsevier Science Publishers B.V., pp. 376-380 (1991).

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TN	AA36	7-297496 A	11/1995	JP			Abstract Enclosed
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TN	AE36	Rowland, L.B. *et al.*, "Aluminum nitride/silicon carbide multilayer heterostructure produced by plasma-assisted, gas-source molecular beam epitaxy," *Appl. Phys. Lett. 62(25)*, American Institute of Physics, pp. 3333-3335 (June 21, 1993).
	AF36	He, Z.Q. *et al.*, "Molecular-beam-epitaxy growth of GaN on GaAs (100) by using reactive nitrogen source," *Appl. Phys. Lett. 64(3)*, American Institute of Physics, pp. 315-317 (January 17, 1994).
	AG36	Eaglesham, D.J. and Cerullo, M., "Dislocation-Free Stranski-Krastanow Growth of Ge on Si (100)," *Physical Review Letters*, Vol. 64, No. 16, The American Physical Society, pp. 1943-1946 (April 16, 1990).
	AH36	*Integrated Optoelectronics*, pp. 356-365.
	AI36	Kumakura et al., "Low p-type contact resistance using Mg-doped InGaN and InGaN/GaN superlattices," 2 pages.
	AJ36	Jang, J.-S., "Formation of low-resistance, thermally stable, and transparent Pt-based ohmic contacts to surface-treated *p*-GaN," 2 pages.
	AK36	Smith, M. *et al.*, "Acceptor-bound exciton recombination dynamics in *p*-type GaN," *Appl. Phys. Lett. 67 (22)*, American Institute of Physics, pp. 3295-3297 (November 27, 1995).

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TN	AA37	7-335975 A	12/1995	JP			Abstract Enclosed
	AB37	60-41478 B2	09/1985	JP			Abstract Enclosed
	AC37	62-165991 A	07/1987	JP			Abstract Enclosed
	AD37	64-17484 A	01/1989	JP			Abstract Enclosed

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TN	AE37	Fischer, S. *et al.*, "On *p*-type doping in GaN-acceptor binding energies," *Appl. Phys. Lett. 67 (9)*, American Institute of Physics, pp. 1298-1300 (August 28, 1995).
	AF37	Rubin, M. *et al.*, "*p*-type gallium nitride by reactive ion-beam molecular beam epitaxy with ion implantation, diffusion, or coevaporation of Mg," *Appl. Phys. Lett. 64 (1)*, American Institute of Physics, pp. 64-66 (January 3, 1994).
	AG37	Ohba, Y. and Hatano, A., "Study of H atom behaviour in Mg doped GaN grown by MOCVD," pp. 221-224.
	AH37	Ohuchi, Y. *et al.*, "New Dopant Precursors for n-type and p-type GaN," 2 pages.
	AI37	Toda, A. *et al.*, "Blue-green Laser Diode grown by photoassisted MOCVD," 2 pages.
	AJ37	Ohkubo, M. *et al.*, "Magnesium-doped InGaAs Using $(C_2H_5C_5H_4)_2Mg$: Application to InP-based HBTs," 2 pages.
	AK37	Hierro, A. *et al.*, "Detection and identification of deep levels in n-GaN," 2 pages.

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TN	AA38	1-111375 A	04/1989	JP			Abstract Enclosed
	AB38	3-203388 A	09/1991	JP			Abstract Enclosed
	AC38	4-11375 A	01/1992	JP			Abstract Enclosed
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TN	AE38	Foresi, J.S. and Moustakas, T.D., "Metal contacts to gallium nitride," *Appl. Phys. Lett. 62 (22)*, American Institute of Physics, pp. 2859-2861 (May 13, 1993).
	AF38	Hiramatsu, K. *et al.*, "Relaxation Mechanism of Thermal Stresses in the Heterostructure of GaN Grown on Sapphire by Vapor Phase Epitaxy," *Jpn. J. Appl. Phys.*, Vol. 32, Part 1, No. 4, pp. 1528-1533 (1993).
	AG38	Detchprohm, T. *et al.*, "Relaxation Process of the Thermal Strain in the GaN / α-Al_2O_3 Heterostructure and Determination of the Intrinsic Lattice Constants of GaN Free from the Strain," *Jpn. J. Appl. Phys.*, Vol. 31, Part 2, No. 10B, pp. L1454-L1456 (October 15, 1992).
	AH38	Akasaki, I. and Amano, H., "Perspective Of The UV / Blue Light Emitting Devices Based On GaN And Related Compounds," *Optoelectronics - Devices and Technologies*, Vol. 7, No. 1, Mita Press, pp. 49-56 (June 1992).
	AI38	Hiramatsu, K. *et al.*, "Growth mechanism of GaN grown on sapphire with AlN buffer layer by MOVPE," *Journal of Crystal Growth 115*, Elsevier Science Publishers B.V., pp. 628-633 (1991).
	AJ38	Hiramatsu, K. *et al.*, "MOVPE growth of GaN on a misoriented sapphire substrate," *Journal of Crystal Growth 107*, Elsevier Science Publishers B.V., pp. 509-512 (1991).
	AK38	Amano, H. "P-Type Conduction in Mg-Doped GaN Treated with Low-Energy Electron Beam Irradiation (LEEBI)," *Japanese Journal of Applied Physics*, Vol. 28, No. 11, pp. L2112-L2114 (December 1989).

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TN	AA39	4-209577 A	07/1992	JP			Abstract Enclosed
	AB39	4-236478 A	08/1992	JP			Abstract Enclosed
	AC39	5-110138 A	04/1993	JP			Abstract Enclosed
	AD39	5-343802 A	12/1993	JP			Abstract Enclosed

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TN	AE39	Akasaki, I. *et al.*, "Effects of AlN Buffer Layer On Crystallographic Structure And On Electrical And Optical Properties Of GaN and $Ga_{1-x}Al_xN$ ($0<x\leq 0.4$) Films Grown On Sapphire Substrate By MOVPE," *Journal of Crystal Growth 98*, Elsevier Science Publishers B.V., pp. 209-219 (1989).
	AF39	Akasaki, I. and Amano, H., "Crystal growth of column III nitrides and their applications to short wavelength light emitters," *Journal of Crystal Growth 146*, Elsevier Science Publsihers B.V., pp. 455-460 (1995).
	AG39	Detchprohm, T. *et al.*, "Metalorganic vapor phase epitaxy growth and characteristics of Mg-doped GaN using GaN substrates," *Journal of Crystal Growth 145*, Elsevier Science Publishers B.V., pp. 192-196 (1994).
	AH39	Tanaka, T. *et al.*, "*p*-type conduction in Mg-doped GaN and $Al_{0.08}Ga_{0.92}N$ grown by metalorganic vapor phase epitaxy," *Appl. Phys. Lett. 65 (5)*, American Institute of Physics, pp. 593-594 (August 1, 1994).
	AI39	Kim, S.T. *et al.*, "Optical gain of optically pumped $Al_{0.1}Ga_{0.9}N$/GaN double heterostructure at room temperature," *Appl. Phys. Lett. 64 (12)*, American Institute of Physics, pp. 1535-1536 (March 21, 1994).
	AJ39	Amano, H. *et al.*, "Room-Temperature Low-Threshold Surface-Stimulated Emission by Optical Pumping from $Al_{0.1}Ga_{0.9}N$/GaN Double Heterostructure," *Jpn. J. Appl. Phys.*, Vol. 32, Part 2, No. 7B, pp. L1000-L1002 (July 15, 1993).
	AK39	Maier, K. *et al.* "Radiative Energy Transfer in GaN:Mg/Al_2O_3:Cr^{3+} Epitaxial Systems," *Jpn. J. Appl. Phys.*, Vol. 32, Part 2, No. 6B, pp. L846-L848 (June 15, 1993).

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EXAMINER INITIAL		DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUB-CLASS	TRANSLATION
TN	AA40	0 496 030 A2&A3	07/1992	EP			N/A
1	AB40	0 541 373 B1	09/1998	EP			N/A
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TN	AE40	Detchprohm, T. *et al.*, "Hydride vapor phase epitaxial growth of a high quality GaN film usig a ZnO buffer layer," *Appl. Phys. Lett. 61(22)*, American Institute of Physics, pp. 2688-2690 (November 30, 1992).
1	AF40	Akasaki, I. *et al.*, "MOVPE Growth Of GaN and $Al_xGa_{1-x}N$ And Their Luminescence And Electrical Properties," *Memoirs of the Faculty of Engineering, Nagoya University*, Vol. 43, No. 2, pp. 147-178 (1991).
	AG40	Kuwano, N. *et al.*, "Cross-sectional TEM study of microstructures in MOVPE GaN films grown on α-Al_2O_3 with a buffer layer of AlN," *Journal of Crystal Growth 115*, Elsevier Science Publishers B.V., pp. 381-387 (1991).
	AH40	Hiramatsu, K. *et al.*, "Cathodoluminescence Of MOVPE-Grown GaN Layer On α–Al_2O_3," *Journal of Crystal Growth 99*, Elsevier Science Publishers B.V., pp. 375-380 (1990).
	AI40	Koide, Y. *et al.*, "Effect of AlN Buffer Layer on AlGaN/ α–Al_2O_3 Hereotepitaxial Growth by Metalorganic Vapor Phase Epitaxy," *Japanese Journal of Applied Physics*, Vol. 27, No. 7, pp. 1156-1161 (July 1988).
	AJ40	Nakamura, S. *et al.*, "High-Brightness InGaN Blue, Green and Yellow LEDs with Quantum Well Structures," *Jpn. J. Appl. Phys.*, Vol. 34, Part 2, No. 7A, pp. L797-L799 (July 1, 1995).
	AK40	Nakamura, S. *et al.*, "High-brightness InGaN/AlGaN double-heterostructure blue-green-light-emitting diodes," *J. Appl. Phys. 76(12)*, American Institute of Physics, pp. 8189-8191 (December 15, 1994).

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TN	AE41	Nakamura, S. *et al.*, "High-Power GaN P-N Junction Blue-Light-Emitting Diodes," *Japanese Journal of Applied Physics*, Vol. 30, No. 12A, pp. L1998-L2001 (December 1991).
	AF41	Nakamura, S. *et al.*, "High-power InGaN/GaN double-heterostructure violet light emitting diodes," *Appl. Phys. Lett. 62(19)*, American Institute of Physics, pp. 2390-2392 (May 10, 1993).
	AG41	Nakamura, S. *et al.*, "Si-Doped InGaN Films Grown on GaN Films," *Jpn. J. Appl. Phys.*, Vol. 32, Part 2, No. 1A/B, pp. L16-L19 (January 15, 1993).
	AH41	Nakamura, S. and Mukai, T., "High-Quality InGaN Films Grown on GaN Films," *Jpn. J. Appl. Phys.*, Vol. 31, Part 2, No. 10B, pp. L1457-L1459 (October 15, 1992).
	AI41	Nakamura, S. *et al.*, "Si- and Ge-doped GaN Films Grown with GaN Buffer Layers," *Jpn. J. Appl. Phys.*, Vol. 31, Part 1, No. 9A, pp. 2883-2888 (September 1992).
	AJ41	Nakamura, S. *et al.*, "Hole Compensation Mechanism of P-Type GaN Films," *Jpn. J. Appl. Phys.*, Vol. 31, Part 1, No. 5A, pp. 1258-1266 (May 1992).
	AK41	Nakamura, S., "GaN Growth Using GaN Buffer Layer," *Japanese Journal of Applied Physics*, Vol. 30, No. 10A, pp. L1705-L1707 (October 1991).

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TN	AE42	Nakamura, S. *et al.*, "Highly P-Typed Mg-Doped GaN Films Grown with GaN Buffer Layers," *Japanese Journal of Applied Physics*, Vol. 30, No. 10A, pp. L1708-L1711 (October 1991).
	AF42	Nakamura, S., "*In Situ* Monitoring of GaN Growth Using Interference Effects," *Japanese Journal of Applied Physics*, Vol. 30, No. 8, pp. L1620-L1627 (August 1991).
	AG42	Nakamura, S. *et al.*, "Novel metalorganic chemical vapor deposition system for GaN growth," *Appl. Phys. Lett. 58(18)*, American Institute of Physics, pp. 2021-2023 (May 6, 1991).
	AH42	Okamura, H. *et al.*, "Optical properties near the band gap on hexagonal and cubic GaN," *Appl. Phys. Lett. 64(22)*, American Institute of Physics, pp. 2997-2999 (May 30, 1994).
	AI42	Grzegory, I. *et al.*, "III-V Nitrides-Thermodynamics And Crystal Growth At High N_2 Pressure," *J. Phys. Chem. Solids*, Vol. 56, No. 3/4, Pergamon Press, pp. 639-647 (1995).
	AJ42	Zur, A. and McGill, T.C., "Lattice match: An application to heteroepitaxy," *J. Appl. Phys. 55 (2)*, American Institute of Physics, pp. 378-386 (January 15, 1984).
	AK42	Antonov, P.I. *et al.*, "Anisotropy Of Thermoelastic Stresses In Shaped Sapphire Single Crystals," *Journal of Crystal Growth 52*, North-Holland Publishing Company, pp. 404-410 (1981).

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TN	AE43	Eliseev, P.G. *et al.*, "Impurity-Related Photoluminescence From InGaN LED Material," pp. 104-105.
	AF43	Kishino, S. *et al.*, "Half-width and peak-intensity measurement of a rocking curve obtained from silicon on sapphire using soft x-ray beams," *Journal of Applied Physics*, Vol. 48, No. 7, American Institute of Physics, pp. 3138-3140 (July 1977).
	AG43	Palummo, M. *et al.*, "Electronic Structure of Cubic GaN with Self-Energy Corrections," *Europhysics Letters*, 26 (8), pp. 607-612 (1994).
	AH43	Bulman, G.E. *et al.*, "Demonstration of a Cleaved-Facet InGaN/GaN MQW SCH Laser Grown on 6H-SiC," 2 pages.
	AI43	Trilhe, J. *et al.*, "Characterization Of The Silicon-Sapphire Interface," *Journal of Crystal Growth 45*, North-Holland Publishing Company, pp. 439-444 (1978).
	AJ43	Sun, C.J. *et al.*, "Thermal stability of GaN thin films grown on (0001) Al_2O_3, (0112) Al_2O_3 and $(0001)_{Si}$ 6H-SiC substrates," *J. Appl. Phys. 76 (1)*, American Institute of Physics, pp. 236-241 (July 1, 1994).
	AK43	Hsu, S.T., "Electron Mobility in SOS Films," *IEEE Transactions on Electron Devices*, Vol. ED-25, No. 8, IEEE, pp. 913-916 (August 1978).

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FORM PTO-1449 FIFTH SUPPLEMENTAL INFORMATION DISCLOSURE STATEMENT	ATTY. DOCKET NO. 2005.0020003	APPLICATION NO. 09/604,097
	APPLICANTS Yukio SHAKUDA	
	FILING DATE June 27, 2000	GROUP 2828

FOREIGN PATENT DOCUMENTS

EXAMINER INITIAL		DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUB-CLASS	TRANSLATION
	AA44						
	AB44						
	AC44						
	AD44						

OTHER (Including Author, Title, Date, Pertinent Pages, etc.)

TN	AE44	Rubio, A. *et al.*, "Quasiparticle band structures of short-period superlattices and ordered alloys of AlN and GaN," *Physical Review B*, Vol. 49, No. 3, The American Physical Society, pp. 1952-1956 (January 15, 1994).
	AF44	Shul, R.J. *et al.*, "Plasma-Induced-Damage of GaN," *Electrochemical Society Proceedings*, Vol. 96-15, pp. 232-243.
	AG44	Shul, R.J. *et al.*, "High-Density Plasma-Induced Etch Damage of GaN," 10 pages.
	AH44	Shul, R.J. *et al.*, "Comparison of Dry-Etch Techniques For GaN, InN, and AlN," 7 pages.
	AI44	*ION Source Refefence Guide*, Commonwealth Science Corporation, 17 pages.
	AJ44	Shul, R.J. *et al.*, "Inductively Coupled Plasma Etching of GaN," 13 pages.
	AK44	Adesida, I. *et al.*, "Characteristics of chemically assisted ion beam etching of gallium nitride," *Appl. Phys. Lett. 65(7)*, American Institute of Physics, pp. 889-891 (August 15, 1994).

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	AA45						
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TN	AE45	Pearton, S.J. *et al.*, "Ar⁺-ion milling characteristics of III-V nitrides," *J. Appl. Phys. 76(2)*, American Institute of Physics, pp. 1210-1215 (July 15, 1994).
	AF45	Pearton, S.J. *et al.*, "Letter to the editor: Dry etching of thin-film InN, AlN and GaN," *Semicond. Sci. Technol. 8*, pp. 310-312 (1993).
	AG45	Shul, R.J. *et al.*, "Comparison of Dry Etch Techniques for GaN," 9 pages.
	AH45	Tojyo, T. *et al.*, "GaN-based High Power Blue-violet Laser Diodes," 5 pages.
	AI45	Koike, M. *et al.*, "RT-CW operation of GaN-based Laser Diodes improved by GaN/HaInN optical guiding lasers," 2 pages.
	AJ45	Lagerstedt, O. *et al.*, "Properties of GaN tunneling MIS light-emitting diodes," *J. Appl. Phys. 49(5)*, American Institue of Physics, pp. 2953-2957 (May 1978).
	AK45	Self, K., "Prolog to Emerging Gallium Nitride Based Devices," *Proceedings Of The IEEE*, Vol. 83, No. 10, p. 1305 (October 1995).

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	AA46						
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TN	AE46	Mohammad, S.N. *et al.*, "Emerging Gallium Nitride Based Devices," *Proceedings of the IEEE*, Vol. 83, No. 10, pp. 1306-1355 (October 1995).
	AF46	Goldenberg, B. *et al.*, "Ultraviolet and violet light-emitting GaN diodes grown by low-pressure metalorganic chemical vapor deposition," *Appl. Phys. Lett. 62(4)*, American Institute of Physics, pp. 381-383 (January 25, 1993).
	AG46	Shan, W. *et al.*, "Pressure-dependent photoluminescence study of wurtzite GaN," *Appl. Phys. Lett. 66(25)*, American Institute of Physics, pp. 3492-3494 (June 19, 1995).
	AH46	Wang, Y. and Mikkola, D.E., "Shock deformation of sapphire single crystals," *Materials Science and Engineering*, Elsevier Sequoia, pp. 25-32 (1991).
	AI46	Akasaki, I. And Amano, H., "High efficiency UV and blue emitting devices prepared by MOVPE and low energy electron beam irradiation treatment," *Proceedings of SPIE: Physical Concepts of Materials for Novel Optoelectronic Device Applications I: Materials Growth and Characterization*, pp. 138-149 (October 28-November 2, 1990).
	AJ46	Neugebauer, J. and Van De Walle, C.G., "Defects And Doping in GaN," pp. 2327-2330.
	AK46	Abernathy, C.R., "The Role of Hydrogen In UHV Growth of III-V Semiconductors," *Materials Science Forum*, Vols. 148-149, Trans Tech Publications, pp. 3-25 (1994).

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	AA47						
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	AC47						
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TN	AE47	Wetzel, C. *et al.*, "Excitation Spectroscopy and Level Assignment in Piezoelectric $Ga_{1-x}In_xN$/GaN Quantum Wells," 2 pages.
	AF47	Matsuoka, T. *et al.*, "Wide-Gap Semiconductor InGaN and InGaAlN Grown by MOVPE," *Journal of Electronic Materials*, Vol. 21, No. 2, pp. 157-163 (1992).
	AG47	Albanesi, E.A. *et al.*, "Theoretical study of the band offsets at GaN/AlN interfaces," *J. Vac. Sci. Technol. B 12(4)*, American Vacuum Society, pp. 2470-2474 (July/August 1994).
	AH47	Dissanayake, A. *et al.*, "Low-temperature epitaxial growth and photoluminescence characterization of GaN," *Appl. Phys. Lett. 65(18)*, American Institute of Physics, pp. 2317-2319 (October 31, 1994).
	AI47	Wickenden, D.K. *et al.*, "Thermally annealed GaN nucleation layers and the device-quality metal organic chemical vapor deposition growth of Si-doped GaN films on (00.1) sapphire," *J. Appl. Phys. 75(11)*, American Institute of Physics, pp. 7585-7587 (June 1, 1994).
	AJ47	Saxler, A. *et al.*, "High quality aluminum nitride epitaxial layers grown on sapphire substrates," *Appl. Phys. Lett. 64(3)*, American Institute of Physics, pp. 339-341 (January 17, 1994).
	AK47	

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